

THE NATIONAL INSTITUTE OF
INDUSTRIAL PSYCHOLOGY



WOMEN'S ATTITUDES TO
REPETITIVE WORK

BY

DAVID COX

ASSISTED BY

K. M. DYCE SHARP and D. H. IRVINE

PUBLISHED IN LONDON BY THE
NATIONAL INSTITUTE OF INDUSTRIAL PSYCHOLOGY
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REFERENCES.

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WOMEN'S ATTITUDES TO REPETITIVE WORK

ORIGIN OF THE INQUIRY

BETWEEN 1948 and 1950 the Institute carried out research sponsored by the Human Factors Panel of the Committee on Industrial Productivity on certain aspects of repetitive or 'mass production' work (1). This dealt with the effects of job breakdown and of supplying work in different sized batches; and the conclusions were of direct value only in this limited area. Indirectly, however, they suggested the need for a more general study of repetitive work and its influence on the worker, and led to the present inquiry, which was made possible by funds provided by the Medical Research Council.

The study proceeded in two parallel parts: job studies to identify observable characteristics in repetitive industrial tasks, and interviews with the workers involved in these tasks. The general principle was to evaluate the importance attached by the worker to various observable features in the job, with a view to subsequent experiments planned to examine the effects of such features in more detail.

This report describes the job study and interview procedures and the method of analysis of data; the material is discussed and certain conclusions and suggestions for further work are added. Large masses of material—for example, the full job descriptions—are as far as possible relegated to appendices in order to keep the body of the text straightforward.

JOB STUDY AND INTERVIEW METHOD

The Institute had a fund of experience to draw upon in the field of job study (2) and interviewing (3); the former for purposes of selection, training and work simplification, and the latter in the free interview methods of attitude surveys of a generally diagnostic nature. An adaptation was needed to deal with the particular problems being considered; this was made by a process of pilot runs.

After discussion amongst the research team and others, a standardised form of record for job studies was drawn up. After being tried out on several jobs, this was modified to the form shown in Appendix I, referred to as ORT 1/2 Parts 1 and 2. Part 1 dealt with the general conditions common to all jobs in any establishment, Part 2 with those peculiar to a single job. Continued use in the main part of the study suggested that further modifications would have been desirable, but for the sake of uniformity all the jobs were recorded in the first place on this form.

It was clear that an entirely free interview would be uneconomical; information was needed on particular aspects of the work situation, and some form of guidance in their direction was aimed at. It had to be of a nature that would guide the worker's attention to the required area without suggesting answers, and as far as possible without emphasising particular topics in that area. Preliminary interviews accompanying the pilot job studies led to a standardised interview whose form is shown in Appendix I, ORT 2/2, and which is described later.

JOB STUDY

Perusal of the job study check list, ORT 1/2, shown in Appendix I, might suggest that the attempt to collect information was too ambitious. The general principle adopted was to seek information on any point which might be of interest, and the check lists were made extremely comprehensive. Often they were not filled in completely; for example, in Part 1, the section on labour turnover. The overall figures were

normally available, but a breakdown by departments was not; moreover, data from which it could be derived were too unreliable to be of use.

Part 1 was filled in largely from records in the personnel office or other central source, checked at departmental level if it seemed desirable. Much of the information had usually become available as a result of preliminary inquiries before the investigation started—during the period when the firm was considering giving facilities for the study.

Section 1 of Part 2 of the check list had a number of items resembling those of Part 1, carrying a stage further the information about recruitment and training; more detail was asked for on such matters as overtime, actual take-home pay, and so on; in Part 1 general averages were recorded, while in Part 2 actual figures for typical individuals and periods of time were used. The facts on physical environment were general assessments made by the investigator; detailed temperature records were not taken, though in some cases spot checks on light intensity were made. In no case did the conditions approach the abnormally hot situations of, for example, furnace work; conditions were in all cases in the range regarded as 'normal'.

Detailed Description

Section 2 of Part 2 of ORT 1/2 covers the essential part of the job study; the preceding data were really the framework in which the latter part was to be considered. Much of this part of the study was made by observation of the worker, and needed her co-operation. At the beginning of this stage the investigators had usually met the supervisors concerned, and the latter introduced them to a few key operators with some explanation of their visit. During the studies, the investigator would give further explanations as far as this was possible without interrupting work; operators accepted this procedure and were willing to help.

The 'description of duties' was filled in from observation amplified by some questioning

of operators on specific points, in particular on learner difficulties. The items on 'nature of skill' required considerable judgment on the part of the investigator, and were found in practice to be rather unreliable. The items from 'responsibility for quality' onwards were more factual, dealing with the real matters of task organisation, and in fact proved to concern those things which were most mentioned in the interviews — task rotation, change of task, variety, output—and which are discussed in the general conclusions.

In suitable cases the investigators actually worked on the job being studied, but scope for this was limited by the need to maintain a rate of output beyond the capacity of a raw beginner. The contact with operators at this stage was considerable, even though actual exchange of words was limited; detailed observation and a few carefully framed questions built up a rapport on the actual job as quickly as at an interview but with far less verbal exchange. In fact, with many people on this type of work, not fluent with words, it may be that the chance to do some of the explaining with actions rather than words leads to more real exchange of ideas.

A difficulty was encountered at first in deciding what constituted a 'job' or 'task'. The definition arrived at is given below in the section on 'Description of the Jobs Studied'; it need not be put here. The chief difficulty arose in those jobs where a team 'rotated'—shared, say, half a dozen tasks which were changed round at intervals. The general conditions of the job were common to all the parts studied, but the details on the later parts of the check list were different; one part of the job might be paced, another unpaced, and so on. As a matter of technique, it was found convenient to make up a variation of the check list, with a common section for the earlier points and separate parts as required later.

INTERVIEW

Selection of People for Interview

Where a considerable number of people did the same job, only a proportion was interviewed.

When possible, a representative sample was selected at random; a list of clock numbers was taken and the investigator took a sufficient number, not knowing which operators they represented. Sometimes this method could not be adopted; only certain people were available owing to production needs, and it was necessary to accept them. This did not leave merely the poorer operators; where operators changed tasks from time to time, their availability for interview depended on the particular work they were on, and by waiting one could arrange to deal with a representative sample.

On some jobs there was only one operator, and consequently one interview. Table 1 summarises the distribution of interviews, showing the number of jobs from which 1, 2, 3 or more people were interviewed.

TABLE 1 :
NUMBER OF OPERATORS ON VARIOUS JOBS
WHO WERE INTERVIEWED

From each of 12 job(s)	...	1 person(s)
" "	4 "	2 "
" "	2 "	3 "
" "	3 "	4 "
" "	5 "	5 "
" "	2 "	6 "
"	1 "	7 "
"	1 "	8 "
" "	2 "	9 "
"	1 "	14 "
"	1 "	17 "
"	1 "	21 "

It was hoped that a fair proportion of men would be included among the operators interviewed, but in fact this was not the case. In the main part of the study, as distinct from the pilot runs, only one factory employed any considerable number of men on repetitive tasks; six of them were interviewed. This left a total of 160 women and 6 men; too few men to allow a comparison between the sexes. There were indications of a difference in attitude to repetitive work, so that it seemed safer to consider only the 160 interviews with women. The men's interviews have therefore been ignored.

Conduct of the Interviews

The investigator was in every case known to the person before interview, since he or she had made job studies and had casual conversations with most operators involved. But it was necessary to give a proper explanation of the reasons for this, to the operator unusual, activity; this was done in a set form as laid out in ORT 2/2 (Appendix I). The reason for this standard explanation was that of avoiding suggestion, or at least of making it the same in all cases; there was no objection to re-phrasing parts of the wording if it did not seem to be understood, but the sense was pretty closely followed. In addition to explaining the interview, the preliminary talk gave a promise of confidence, which was readily accepted.

Sometimes operators would raise questions during the explanation, and these were answered; if no questions had arisen, the interviewer gave opportunity before proceeding beyond the explanation. Such questions were noted; frequently they led to a discussion of the operator's point of view and were a useful opening to the fact-finding part of the procedure. Notes were made in the appropriate part of the form ORT 3/2 (Appendix I) so that the origin of remarks could be subsequently analysed if necessary.

Certain biographical details were noted about each person interviewed; usually these were collected at the beginning of the interview, but not always. If the explanation led to a useful flow of information, this was followed up without interruption; if not, an inquiry about previous jobs was made, and might itself lead on to comments about preferences in tasks or other matters relevant to the investigation. Brief data about home circumstances bearing on the degree of economic incentive to work were collected at such points in the interview as seemed tactful.

Although the opening of the interview varied as to the order in which items were dealt with, from this point both order and content were planned. First, the investigator checked with the worker certain parts of the job study—those parts dealing with physical environment and performance and organisation of the task. The

general approach was "I have been studying what you do, and would like to make sure I have not missed anything important; this seems to me to be a fair description, but possibly you may want me to alter it a bit—". The aim was partially that of checking; but also in the pilot study it had been found that discussion of the job description was a good way to get the operator talking. Any points arising were noted down, and follow-up questions were used at the interviewer's discretion.

The next stimulus was in the form of 15 cards laid down in front of the operator; each carried a reference to some aspect of task organisation and was numbered. To avoid possible stress on No. 1, the numbers ran from 11 to 25, and the list of cards was as follows:

11. Cleanliness, comfort and safety of the work.
12. Amount of sitting or standing or walking about.
13. How much you need to know or be able to do; skill or knack.
14. Being left to get on with the job yourself.
15. Having to keep up a high standard of quality.
16. The chance to make little changes in method or order of doing parts of the job.
17. Materials or tools or machines used on the job.
18. The way that the work is shared out.
19. Knowing how well the job is going throughout the day.
20. Pace of working.
21. Stoppages or hold-ups that you cannot avoid.
22. Things about the job which look or feel nice, or which you can admire.
23. A chance to be with other people.
24. Seeing some result of your efforts.
25. Things that keep you trying hard.

The cards were laid in random order and explained; it was pointed out that they were to be used as reminders of topics that might interest

the operator, that she might not wish to deal with all of them, and that it would be well to look at them all before beginning to speak. The interviewer noted remarks arising, and the number of the card which gave rise to each; follow-up questions were used, but in a fairly restrained manner so as not to suggest possible answers or to lead on to topics other than those chosen by the operator. Thus, for example, if the response to Card 17 was "Oh, they're awful"—materials or tools or machines—one would have to use a follow-up question to ascertain which particular item was the trouble, and why. One might already have formed an opinion of the maintenance arrangements, but would have to avoid any suggestion of this in the questions, waiting to see if the operator attributed trouble to the same cause or some other.

When the operator seemed to have exhausted her first interest in the cards, and to have nothing more to say (this might be after referring to as few as two or as many as twelve of them) the interviewer gave one prompt, and one only: "Do you want to say any more about these before I put them away?" Any remarks arising after the prompt were recorded separately from those given before it.

Next, the interviewer read out twelve questions one at a time.

1. Do you get more or less satisfaction from the job now than when you started?
More / same / less.
2. How difficult have you found it to get used to the job?
3. Does this job give you too much/Enough/ too little/variety?
4. (a) How far does this job require all your attention?
(b) If not, how do you manage to keep your mind occupied?
5. How far do you feel cut out for the job; how far does it make full use of your abilities?
6. When you come in one morning feeling depressed (I expect you do now and then)
(a) Is there enough to think about in the

job to make you forget your troubles?

(b) If not, can you put in a bit of extra effort to take your mind off them?
(Follow-up for reasons—job *per se* or what)

7. When you come in feeling really good, does the job ever spoil that feeling?
(Follow-up again.)
8. Can you think of any way the job could be re-arranged to make it more interesting or likeable?
9. What things do you like in this job that you did not find in previous jobs?
10. What things do you miss in this job that you found in previous jobs?
11. If you had changed to another sort of work for some reason, and then got laid off, would you try to get back to this particular job of (name it) or not?
(Follow-up to see if the like or dislike is for the task or the firm.)
12. Do you know anything about other jobs in this factory? If so, how much, and how did you find out? Do you think it is useful to know about other jobs in this factory?

The answers were recorded, as were also follow-up questions and answers. Where the answer to a question had already been obtained in earlier parts of the interview, the question was omitted; thus Question 9 might have been effectively answered in an earlier discussion of the operator's previous jobs.

Card Ranking

One other procedure was included in the interview, a preference scale. This was not regarded as essentially part of the investigation and its results are not reported herewith; but since the opportunity presented, it was thought reasonable to spend a few minutes on a scale which aimed to rank various job characteristics in order of importance. Ten cards were laid in random order before the operator, who was asked to choose that which was most important to her. The cards were:

- A. Your surroundings on the job. Lighting, heating, comfort, and so on.
- B. Kind of foreman, chargehand, or supervisor.
- C. Reputation of firm.
- D. Chance of promotion.
- E. Pay.
- F. Having a job where you are not likely to be laid off.
- G. Starting time, days and hours per week, shifts.
- H. Doing the work you like.
- K. Workmates.
- L. Other things besides pay that the firm offers:
 - Holidays
 - Sick Pay
 - Pension Scheme
 - Canteen
 - Sports Club
 - Social affairs, and so on.

The interviewer took the card chosen as most important, noted it, and removed it; of the remaining nine he then asked for the least important. The procedure was repeated with a choice of most and least important of the remainder, removing the chosen cards till only two were left for the final choice.

The weakness of this procedure lay in deciding what it measured. Intended to indicate in general terms the importance of the ten characteristics, in fact it probably indicated their degree of development in the particular factory. For example, a low rank assigned to Card D, 'Chance of promotion', probably did not mean that the operator was not interested in a better job, but merely that in that particular factory promotion was so unlikely that it was not seriously considered. (In fact this was accepted as a disadvantage, but compensated by other things such as high pay or pleasant surroundings.)

Occasionally the card ranking produced remarks which were of use in assessing the worker's attitude to the job; these were duly recorded as part of the main interview data. As a finish to the interview, the ranking was convenient since it drew the operator's attention to general considerations at a point where her remarks on them could be made without interrupting the gathering of detailed information.

Duration of Interviews

The duration of interviews varied from one operator to another and to some extent between interviewers. The minimum time was just under half an hour, the maximum rather more than an hour and a quarter.

DESCRIPTION OF THE JOBS STUDIED

In order to describe the various jobs, it is convenient to make use of certain terms such as 'job', 'task' and 'variety' in a particular sense not quite the same as their normal usage. Working definitions are given below; they are not necessarily comprehensive and final.

DEFINITIONS

Job. A person's normal run of work over a period of a week or more, including such changes of activity as are usual. Example: 'packing' as a job may cover packing several sizes and types of a product and such cleaning up as is directly within the operator's sphere. But a packer asked to do overtime on general cleaning would be doing another job during this time, according to the definition.

Task. A cycle of operations carried out by a person for a period of time (not usually less than half an hour, often a whole day). This is the essential basic unit of work repeated by an operator on each unit of production.

Sub-Task. A particular and identifiable operation within the repeated cycle forming the task.

Change of Task. Sometimes a job may include several tasks which are done at various times, not necessarily in an order whose planning is apparent to the operator. Where the change from one task to another is imposed by circumstances outside the operator's control at seemingly irregular intervals, this is called change of task.

Rotation of Task. Sometimes each operator of a team does a different task or sub-task in the whole job or task and there is a change-round of these activities at more or less regular intervals. This situation is referred to as rotation of task. It is usually official in that the management encourages and regulates it; sometimes an unofficial rotation is arranged between operators.

Variety. This refers to variety in material worked on and includes variety in size or type where this is not great enough to constitute change of task; also variety in colour or such observable attribute which does not

affect the actual method of working.

Variation in Method. Some tasks are so rigidly organised that variations in the order of carrying out sub-tasks, or in method, are impossible. Others do allow of such variation, which is referred to as variation in method. Example: in wiring up a radio set, some variation may be made in the order of connecting wires, provided the operator has more than one wire to deal with. If, however, each operator has only one specified part to fix in and wire, there will be no chance of variation since there is only one thing to do.

Pacing. Regulation of working speed by some influence not under the individual worker's control. There is a wide range of types and kinds of pacing, from the rigidly controlled machine feeding task downwards. A task where the machine is under the operator's control is taken to be unpaced, but one, not necessarily involving machinery, where the individual has to keep up with a team is considered paced.

CATEGORIES OF JOBS

It is to be expected that operators' views on work will be connected with the job rather than with the task; there may be, and often are, particular tasks within the job which carry more or less satisfaction, but the attitude to the work done (as distinct from the attitude to the 'social' situation) will depend on the general run of the work. For this reason the work done has been classified on a job rather than on a task basis.

A description of each job is given in some detail in Appendix II; in order to clear the text only a summary is given below, showing the outstanding characteristics. A form of rating has been adopted; the estimates of 'skill', demands on intelligence, and so on, are subjective and arbitrary, being designed as a means of comparing one job with another, not as a means of comparing any of them with an external standard. Two tables are given, Table 2 indicating the basis of rating, and Table 3 showing the jobs rated in this manner.

TABLE 2:

JOB CHARACTERISTICS RATED

Description	Rating
1. Time taken to learn:	
One can learn how to do the job in a few minutes, can do it at acceptable speed after a day or two ...	... c
One can learn to do it in a few minutes, but speed takes a week or two to acquire	... b
Job takes days or a week or more to learn, several weeks to be proficient ...	... a
2. Estimated demands on intelligence:	
Simple job requiring only rule of thumb	... d
Fairly simple but occasionally operator needs to use commonsense reasoning	... c
Job where operator must use thought to avoid mistakes	... b
Note: The above jobs are such as could be adequately done by a person not above 50th percentile of the general population in a test of 'g'.	
Job where a rather more than average degree of intelligence is needed	... a
3. Work Flow:	
Flow of work poor, hold-ups common ...	... c
Reasonable flow of work, a few hold-ups	... b
Very good flow of work, no hold-ups to speak of	... a
4. Team or Individual Work:	
Team job	... a
Individual job done in fairly close contact with others—able to talk occasionally	... b
Individual job isolated from others	... c
5. Pacing of Main Task of the Job:	
Job rigidly paced by machine, etc.	... d
Job more or less paced by need to keep up with team	... c
Job in which machine is regulated by the operator, but cannot be speeded up	... b
Unpaced task	... a
6. Change of Task:	
There is a change of task +
There is no change of task, or very rarely	... —
7. Rotation of Task:	
There is rotation of task +
There is no rotation of task —
8. Variety:	
Considerable variety in the defined sense	... a
Some variety but not much ...	... b
Hardly any variety	... c
9. Variation in Method:	
Considerable opportunity to vary the order of sub-tasks or to vary method	... +
Very little or no chance to vary	... —
10. Posture:	
Nearly all sitting down ...	... a
Choice of sitting or standing	... b
Nearly all standing at one place	... c
Job allows freedom to move about	... d

TABLE 3:

JOBS RATED ACCORDING TO THE CHARACTERISTICS OUTLINED ABOVE

Factory No.	Job No.	Job Title	Time to learn	Intelligence demands	Work flow	Team or individual work	Pacing	Change of task	Rotation of task	Variety in material	Variation in method	Posture
2	1	Magneto Winding	...	a	a	a	a	—	—	—	—	a
2	2	Dial Printing	...	c	c	c	b	—	—	—	—	a
4	3	Armature Winding	...	a	c	c	b	—	—	—	—	a
4	4	Armature Connecting	...	a	c	c	b	—	—	—	—	a
5	5	Sewing	...	a	a	b	a	—	—	—	—	a
6	6	Coil Taping	...	a	c	a	a	—	—	—	—	a
7	7	Bottom Plate Gask. Assy.	c	c	a	a	c	—	—	—	—	a
8	8	End Caps Assembly	c	c	a	a	c	—	—	—	—	b
9	9	Friction Taping	b	c	a	a	c	—	—	—	—	a
10	10	Cord Assembly	b	c	a	a	c	—	—	—	—	b
11	11	Motor Casing Assy.	b	c	a	a	c	—	—	—	—	a
12	12	Carton Stitching	b	c	a	a	c	—	—	—	—	d
5	13	Food Packing	b	c	a	a	d/c	—	—	—	—	b
	14	Pharmaceutical Packing	b	c	a	a	c	—	—	—	—	b
15	15	Adana Printing	c	b	a	c	a	—	—	—	—	a
16	16	Ampoule Washing	c	c	a	a	a	—	—	—	—	b
17	17	Ampoule Inspection	b	c	a	a	a	—	—	—	—	b
18	18	Ampoule Labelling	c	c	a	c	b	—	—	—	—	a
19	19	Machine Operation	a	a	c	c	b	—	—	—	—	b
20	20	Pool Operators	c/b	c/d	c/b	a/b	a/b/c	—	—	—	—	+ a/b/c/d
6	21	Paste and Carry	c	d	a	a	c	—	—	—	—	d
22	22	Label and Wipe	c	c	a	a	c	—	—	—	—	d
23	23	Track Jobs	c	c	a	a	c	—	—	—	—	c
24	24	Odd Jobs	c	c	a	b	a	—	—	—	—	a
25	25	Oiling	b	d	b	b	c	—	—	—	—	d
26	26	Power Press	b	d	b	b	a	—	—	—	—	b
27	27	Hand Press	b	d	b	b	a	—	—	—	—	b
7	28	Tablet Machine	c	c	a	a	d	—	—	—	—	b
29	29	Tin Bench	b	d	a	a	d	—	—	—	—	b
30	30	Bundler	b	c	a	a	d	—	—	—	—	b
31	31	Packing Bottles	b	c	b	a	d	—	—	—	—	b
32	32	Odd Jobs	b/a	c/b	a	a	c	—	—	—	—	b
8	33	Filing	a	b	b	b	a	—	—	—	—	d
34	34	' Intermediate '	b	b	a	b	a	—	—	—	—	a/d
35	35	' Junior '	a	b	a	b	a	—	—	—	—	a/d

The titles of the jobs in the above table are largely self-explanatory, but it may be convenient to add some remarks about the factories. Factory No. 2 made small electrical gear, as did also No. 4; the former turned out perhaps a more delicate type of work, certainly in as far as the magneto winding was more delicate than the armature work of Factory No. 4. Factory No. 5 was concerned in packing drugs and patent foods; Job No. 19 there was the operation of automatic packaging machines. Job No. 20, showing a wide range on the rating scales, concerned 'pool' operators who moved from task to task at frequent and unpredictable intervals.

Factory No. 6 made up composite canisters—the type of 'tin' with a cardboard body and metal ends. Jobs 21 and 22 were on labelling lengths of cardboard tube; 23 was an assembly line working with the machine which seamed the ends on to the canister body. Job No. 25 consisted in oiling the sheets of plate preparatory to supplying the presses which stamped metal ends from them. Factory No. 7 made and packed patent food; only the packing jobs were studied. Factory No. 8 was actually the office of Factory No. 7, or those departments where work was of such a routine nature as to be comparable with repetitive production work: the filing department (Job 33) and the invoice department (Jobs 34 and 35).

THE INTERVIEW MATERIAL

The main purpose of the interviews was to find out how far the factors connected with the actual job and task made for satisfaction or dissatisfaction in the operators. In so far as a factor might not affect some workers in the same way as others, individual differences must be considered, but it must always be remembered that the primary aim was to examine the reaction of workers to the job rather than to follow up differences between workers.

For similar reasons, material bearing on the social situation at work—supervision, personnel matters and so on—has only been included when it had a fairly obvious connection with the actual job. For example, relations with fellow-workers have been considered in so far as the way the task is organised will allow people to talk while performing it; status in that it was sometimes status connected with doing a particular job or task.

METHOD OF CLASSIFICATION

Quantity of Information

In discussing the material, a 'remark' is taken to mean one occasion on which one person put forward a view. Where a number of 'remarks' were substantially similar and could be classed together without noticeable loss of meaning under one typical statement, this latter is referred to as a 'comment'. For example, the remarks:

"Different machines not as good as your own."

"Annoying to clean one machine on Friday and get another on Monday."

"Used to own machine; other machines a nuisance and you don't know what is wrong with them"

together with others, were all classified as the comment "Dislikes moving to other machines".

The number of remarks on a particular point of work organisation is not a precise guide to its importance for the workers, but it is a useful

indication. Some explanation of the basis of numbering is desirable at this stage.

Statements which followed from one stimulus—e.g., job description, card or question—were taken as one remark so long as they were on the one subject. Thus, if Card 23, 'A chance to be with other people' provoked a series of connected statements that the person liked this, they were considered as one remark. If follow-up questions elicited that the liking was due to the fact that it allowed for rotation of task as well as social contact, this latter was registered as another remark under its appropriate comment heading. Had some previous or subsequent part of the interview led to a statement in favour of working with others, this would have been counted as a second remark under the same heading as that of the remark arising from Card 23.

Briefly, one person might make more than one remark that would go into the same comment heading, but this duplication could only arise when almost identical remarks arose from different parts of the interview; a connected series of remarks on the same point would count as one remark. It was assumed, and in practice the assumption was borne out, that a remark would only occur twice from one person if that person felt strongly about it. If an operator had already commented on, say, opportunities for sitting or standing at the task and was then confronted with Card 12, 'Amount of sitting or standing or walking about', there were two alternative responses. If she felt strongly on the point she would make further statements, counted as another remark; if not, she would say something such as "Oh, we've dealt with that before" and only the one remark would stand.

'Subjective' and 'Objective' Classification

Every remark was classifiable under at least two headings; its more or less identifiable cause in the environment ('objective' above) and the worker's affective state which gave rise to it

(‘subjective’). Simple remarks such as “I like to be able to stand part of the time and sit part of the time” were easily referred to the physical environment; but such a remark as “Changing task every hour stops you getting bored” was liable at first to mis-classification. It invited the formation of a heading relevant to the ‘subjective’ but not the ‘objective’ classification; the first efforts at analysis failed through mixing the two aspects.

To avoid confusion, every remark was eventually assigned to both classifications, since it had both an ‘objective’ cause in the environment and arose from a ‘subjective’ affect in the worker. Thus the first example given above would come under ‘Physical Conditions—Sitting and Standing’ on the one hand, and under ‘Physiological’ on the other. The second example would be referred to ‘Organisation of Work—Rotation of Task’ and to ‘Desire for Diversity’.

At first sight the ‘subjective’ headings might be expected to give information on why people work. But the allocation to classes under this heading was not reliable; the interviews were not deep enough to explore it effectively, being designed to deal primarily with the ‘objective’ environmental matters. The use of the ‘subjective’ classification was primarily as an aid to clear thinking; the need to put each remark under both headings avoided the initial difficulty of confusing the two.

Basis of the ‘Objective’ Classification

The classification of remarks—and of the comments to which they have been reduced—has been made on an empirical basis rather than on some preconceived arrangement. Certain headings cover the subjects fairly adequately:

Physical Conditions

Materials, Machines and Equipment

Flow of Work

Organisation of Work

Skill and Learning Required by the Work

Responsibility Arising from the Work.

Promotion and Status Associated with the Work Itself

Distractions

Pay

As has been mentioned above, social aspects may appear to enter these headings; Pay, for example. But in such cases only the aspects close to the work have been included; in Pay, only comparisons of one task with another, or similar matters arising primarily from the nature of the work itself.

Appendix III gives the sub-divisions of the nine headings above, as well as the actual comments and the number of remarks covered by each, and further references in the text, such as ‘6 B2’, are to the numbering scheme of this Appendix. The 160 interviews gave rise to 2,782 remarks on the task *per se*, which have been collected into 152 comments, the comment being representative of a number of individual remarks, as has been explained above. In a few cases, the comment is not truly typical; the comment 1 H 4, ‘Physiological effects’ is an example. This particular comment covers only two remarks, and is in fact used as a ‘miscellaneous’ section; 6 F 3, ‘Various clean-up remarks’ is a similar case. There are only a few such comments and they cover a very small proportion of the total remarks.

Of the 152 comments, 63 are positive in tone, expressing satisfaction, and 65 are negative, expressing dissatisfaction, with some environmental condition. The remaining 24 are neutral; 5 of them are of the ‘miscellaneous’ type referred to above, and 19 require further discussion. They are of the type of 2 E 4, ‘Prefers hand task to machine’, or of 8 B 2, ‘Description of learner difficulties’. The former, although neutral in tone, do accurately indicate the remarks covered under the comment; the latter, seven in number, only indicate the trend of the actual remarks. For this reason, Appendix III gives a full list of remarks under these 7 ‘comments’ as well as under the 5 ‘miscellaneous’ ones.

DIFFERENCES BETWEEN INTERVIEWERS AND
BETWEEN FACTORIES

Of the 160 interviews, 86 were carried out by one person, 60 by a second, and 14 by a third. Referring to these as A, B and C respectively, A and C were men, B was a woman. Tables 4 and 5 show the way in which the interviews were distributed between the interviewers and between the factories, which are numbered in accordance with Appendix II describing the jobs studied.

It is apparent from Table 4 that the number of remarks per interview varied fairly widely from 13.0 for interviewer A to 23.3 for B; and that there were almost equally wide variations between factories for interviewer C. It was, therefore, necessary to see if any one interviewer tended to draw more remarks about particular subjects; Table 5 shows the distribution of remarks between the nine main headings into which comments have been allocated, for each interviewer.

TABLE 4:

DISTRIBUTION OF INTERVIEWS BETWEEN INTERVIEWERS AND BETWEEN FACTORIES

	NUMBER OF INTERVIEWS				NUMBER OF REMARKS				REMARKS PER INTERVIEW									
	Interviewer				Interviewer				Interviewer									
	A	B	C	Total	F 2	A	B	C	Total	F 2	A	B	C	Total	A	B	C	
F 2			6	6	F 2			94	94	F 2					15.7	15.7		
a 4		26		26	a 4		615		615	a 4					23.7	23.7		
c 5	49		4	53	c 5	650			95	c 5	13.3				23.7	14.1		
t 6	37			37	t 6	469			469	t 6	12.7				12.7			
o 7		14	4	18	o 7		319	76	395	o 7		22.8	19.0	22.0				
r 8		20		20	r 8		464		464	r 8		23.2			23.2			
y					y					y								
	86	60	14	160		1119	1398	265	2782						13.0	23.3	18.9	17.4

TABLE 5:

DISTRIBUTION OF REMARKS BETWEEN MAIN HEADINGS FOR EACH INTERVIEWER

	Remarks per interview for Interviewer:			
	A	B	C	Mean
Physical Conditions	2.9	3.5	3.5	3.2
Materials, Machines, Equipment	1.4	2.3	1.5	1.8
Flow of Work	2.2	3.6	2.6	2.8
Organisation of Work	3.3	6.6	5.8	4.7
Skill and Learning	2.1	4.2	3.9	3.0
Responsibility	0.9	2.0	0.9	1.3
Promotion and Status	0.03	0.2	0.07	0.1
Distractions	0.1	0.3	0.1	0.15
Pay	0.1	0.6	0.5	0.3
	13.0	23.3	18.9	17.4

It can be seen that the ratio remarks per interview maintains a fairly steady pattern, with B at the top, A at the bottom and C between. There is no obviously apparent bias towards particular subjects on the part of any interviewer; moreover, it may be remarked that A's interviews occupied generally a little over half the time of B's, so that in terms of information gained in unit time there is not a large difference.

After considering the figures underlying these tables, it was decided that information from all three interviewers could be pooled without seriously affecting conclusions to be drawn from it.

GENERAL STATISTICAL SUMMARY

Apart from the 2,782 remarks on matters connected with the immediate job or task, there were 1,100 more dealing with that side of work conveniently referred to as the social environment—general matters concerning all employees at a firm, irrespective of the actual job done. As has been explained earlier, these

remarks have been ignored for the purposes of the present report.

Between 71% and 72% of the remarks, then, referred to the actual work performed; but this cannot be taken as an indication of the relative importance of this aspect to the worker. The interviews were planned and carried out to explore this aspect rather than any other, and interview data showing a preponderance of other material would have been disappointing.

The distribution of comments and remarks between various topics is summarised in Table 6 which is a very much reduced form of the full list of Appendix III.

Of the 2,782 remarks, 1,476 were covered by only 29 of the comments; *i.e.*, just under one-fifth of the comments contained rather more than half the material. From the point of view of presentation, this was convenient, since one could deal with much of the data under relatively few headings. The next section is devoted to the consideration of these 29 comments, followed by more detailed examination of certain possibilities.

TABLE 6:

DISTRIBUTION OF REMARKS BETWEEN TOPICS

Main Heading	No. of Remarks	No. of Comments			
		Total	Positive	Neutral	Negative
Physical Conditions	508	33	17	4	12
Materials, Machines and Equipment ...	285	17	8	1	8
Flow of Work	449	17	7	—	10
Organisation of Work	759	37	16	4	17
Skill and Learning Required	486	16	6	7	3
Responsibility Arising from the Work ...	206	15	6	2	7
Promotion or Status Associated with the Work Itself	16	2	1	—	1
Distractions	24	6	1	2	3
Pay	49	9	1	4	4
	2,782	152	63	24	65

CONTENT OF THE INTERVIEWS

THE MOST FREQUENT REMARKS

Working empirically from the material provided by the interviews, it is reasonable to consider first the comments containing most remarks. Taking an arbitrary limit of 30 remarks or over, it was found that there were 29 such comments, and these are discussed below, more or less in order of the number of remarks; the strict order is departed from in order to deal with related comments together.

Change of Task

Comment 6 C 1 of Appendix III is compounded of 114 remarks—more than any other comment. The typical statement is “Likes change of task”; sometimes this was accompanied by explanations or partial explanations as to why. One reason given was that changing round enabled one to meet different people; but the usual one—only a partial explanation—was that it relieved boredom.

Work Flow

Comment 2 A 3 with 109 remarks refers to the dislike of hold-ups due to bad material, and with it may perhaps be considered comments 5 A 1 and 5 A 2 dealing with work flow. They are under different main headings in Appendix III; 2 is the heading for materials, machines and equipment, while 5 is that for work flow. But all three refer to work flow; the distinction is that the first deals with work flow as it may be affected by the material, and the second and third refer to work flow as it is affected by managerial arrangements.

5 A 1—42 remarks—mentions the liking for a good steady work flow; 5 A 2—55 remarks—is its counterpart and records a dislike of poor flow. It is interesting that practically twice as many remarks were made on poor flow due to bad materials as on irregular flow due to other causes; one might suggest that the former cause is more immediately apparent to the operator. Poor flow as a more or less chronic condition

can come to be accepted; stoppages and snags due to material stand in immediate comparison with the condition of steady work on good material.

Team Work

Comment 6 A 1 contains 81 remarks, on the general theme that operators like a job where social contact is possible with others. No other single comment on this topic has 30 or more remarks, though the total remarks in sub-heading 6 A mount up to 237. The dichotomy between liking team jobs and individual jobs is discussed later, as is the difference in emphasis between the team as a social and as a working group.

Rotation of Task and Variety

The bulk of the remarks under this topic fell into three comments—6 B 1, 4 and 6—which account for 165 comments out of a total of 206 in this sub-heading. The comments, in the order mentioned, are: “Likes task with rotation”, “Change of type, size, colour, etc., gives variety and is liked”, “Would like more variety in the job”. It is interesting to note that whereas there were 38 remarks that the existing amount of variety was liked, far more than this, 63, suggested that operators would welcome more variety.

Demands on Skill and Attention

The comment containing most remarks in this field shows approval that the task does not demand very close attention, and that therefore one can talk or think about other things. This comment (8 C 2) combines 64 remarks; and against it one must put the 48 remarks of comment 8 C 4 from operators who liked a task which occupied the mind rather fully. It would seem that here is one of those points on which there are individual differences, and on which further inquiry might be of use in selection for jobs.

There was a similar division of opinion as to demands on skill, dealt with in comments 8 A 1, 3, 4, 5. While 45 remarks were of the type "Likes reasonably easy task", 33 suggested that the job was too easy and a further 30 "Would like more difficult or more interesting job". In 43 remarks the skill demands were described as "about right". Comment 8 A 2, "Satisfaction experienced in mastering the task", is interesting; it may suggest a solution for the contrary demands for easier and more difficult jobs. There is a satisfaction in overcoming difficulties; it becomes a dissatisfaction when the difficulties are so great as to be beyond, or almost beyond, one's capacity. Satisfaction with the job may be partly attainable by a steady process of training, graded to the operator's capacity, which presents difficulties but ensures that they will be overcome.

On questions of learning, comment 8 B 2 needs little discussion, being the familiar list of learner difficulties. 8 B 1, however, merits some consideration; it deals with the difficulties of acquiring speed in a task. Many repetitive tasks have been deliberately simplified in order that little or no skill shall be called for, and one can learn how to do them in a matter of minutes. But to do them at what is accepted as a reasonable speed may take weeks of practice. It would seem possible that 'skill' is of two kinds: the ability to do really difficult tasks, irrespective of speed, and the ability to do quite simple things fast and accurately. This point is discussed later.

Pace of Work

Under sub-heading 5 B are several opposing comments about pace, and certain of them with less than 30 remarks are mentioned here, since they bear on those with more than 30. 5 B 1, "Likes busy tempo", is backed by 5 B 2, "Does not like slow tempo"; the first has 44 remarks, the second 22. "Pace too fast" (5 B 3, 51 remarks) may be set off against "Pace too slow" (5 B 4, 8 remarks) and "Finds pace about right, likes being paced at this speed" (5 B 5, 25 remarks).

Comments 5 B 6 and 5 B 7 are complementary with 34 and 11 remarks respectively; the first "Likes opportunity to go at own pace" and the second "Dislikes fixed pace". The whole matter of pacing and its speed are discussed later.

Allied to the question of speed of working is that of the amount of work turned out; but the two are not identical. The aim has been to keep in sub-heading 5 B the comments on the actual speed of activity and to deal separately in sub-heading 5 C with satisfactions inherent in seeing the results of fast or slow work. The preponderance of opinion was in favour of seeing a good output (5 C 1, 45 remarks) and of being able to keep count of it directly or indirectly (5 C 3, 51 remarks).

Quality of Product

Comment 9 A 1 (40 remarks) records the satisfaction in seeing a good article turned out, or in feeling that one has done a good job. 9 B 1 (43 remarks) deals with a similar satisfaction, that of being responsible for quality. Under the same heading of 'Responsibility Arising from the Task' come comments on knowing about other jobs in the factory; only one of these has any considerable weight of remarks, 9 D 2. This comment, "Would like to see more of factory", includes 39 remarks.

Physical Conditions

On the matter of posture, comments 1 A 1 and 1 A 2 with 40 and 35 remarks apiece emphasise the preference for a task where one can sit and stand alternately. 1 C 1 and 1 C 2 (55 and 41 remarks) record appreciation of clean tasks and dislike of dirty ones. Work has been done on posture in the past (4), and although these findings on the preference for alternate standing and sitting are by no means new, they do emphasise that those who plan the organisation of tasks should pay particular attention to the point.

DISCUSSION OF COMMENTS

The most frequent remarks have been briefly outlined; the present section aims to discuss various comments which seem important, without undue reference to the frequency of the remarks which they summarise. The comments are discussed in groups related to underlying general causes; in some cases these coincide with the headings of Appendix III, in others they cut across them.

The grouping which seems most productive of constructive ideas is:

Diversity in the job: change of task, rotation of task, variety, variation in method, control over speed.

Skill and attention: speed as a skill, interest and attention, occupying one's mind.

Productivity: attitude to amount of output and to quality of product, efficiency of methods and organisation.

Organisation and teamwork: the extent to which the job or task itself modifies contact between workers.

DIVERSITY IN THE JOB

The common conception of repetitive work is that the operator "Does the same things over and over again". Without going into philosophical arguments as to whether any two things or events can ever be identical, it is clear from the evidence of the interviews and job studies that the things and events comprising repetitive work are often quite sensibly different. Diversity may be introduced into a job by changing what the operator does—rotation or change, in the defined sense; or by changing the speed of doing it—allowing the operator to set the pace; or by changes in the material worked on—variety; or by allowing the operator some freedom to vary the method. The ensuing paragraphs deal with the various comments on these points and attempt to link cause and effect. There was often evidence that a particular job characteristic was a source of satisfaction to many operators, yet that others found it the

reverse; it is in these disagreements that one may seek explanations that are perhaps nearer the truth than those obtained by considering merely the simple majority opinions.

The majority of opinion was in favour of diversity, either approving of it as far as it already existed or wishing for more. Comments 6 B 1-4-6, 6 C 1-4-5, 6 E 1-2, and to some extent 5 B 3-4-6-7, show the trend in favour of more diversity. The general argument in its favour was that it prevented boredom, or "made the time pass quickly". (The latter remark indicates a feeling of constraint at work; and that anything appearing to reduce the constrained period is desirable.) This preoccupation with a feeling of constraint is apparent in the remarks which favour going at one's own pace (5 B 6-7); there was a desire to feel a little in hand, not to be in such a position that any slight difficulty would put the job "up the wall", to quote one operator's phrase.

Comments that favour diversity are spread over rotation, change, variety and pacing; the contrary comments apply rather differently. No comment suggests that variety or rotation was disliked; 6 B 7, with 17 remarks, shows a passive acceptance of lack of variety; the other 'smaller' comments (comments with fewer remarks) add to the majority opinion in favour of variety and rotation. 6 B 3 implies that diversity was needed, but that rotation did not give enough. Comments on change of task and on pacing, however, suggest that a number of people did not accept the diversity ensuing from them as an unmixed blessing; some comments are actively critical of them.

Against Change of Task

Of the 205 remarks in sub-heading 6 C, 42 can be taken as 'against' change of task (6 C 2-3), 18 critical of it (6 C 6), and 18 only conditionally in its favour (6 C 5). The remainder are in favour of change of task. Study of the actual remarks comprising these comments

shows that sometimes the person making them was, even when pressed to do so, unable to express any clear reason for the dislike of change; but more often a reason was given, or can be inferred.

The simplest reason one can offer for preferring constancy of task is that one can get used to the work; if there is a desire to turn out plenty of material, it can be rather frustrating to be put on a relatively strange task. This reason was clearly recognised and stated by some operators; and it is worth noting that by no means all of them were paid by a piece rate or production bonus system, so that some at least desired high output as an end rather than as a means. Allied with loss of output on the strange job as a reason for disliking change was the potential loss of output on the regular job, or, in the operators' own words, "Trouble about change (of task), one gets out of practice".

This loss of practice, or skill, or knack, seemed to be regarded as undesirable not only because of its reduction (or potential reduction) of output, but also because it lowered one's self-respect; "loss of confidence" was the expression used in some cases. This feeling about confidence in one's skill shaded off into a general feeling of security in the job; some comments indicate clearly that too much change was disliked simply because it affected this security. There are various ways in which change can do so; partly through putting an operator with different workmates (mentioned as a cause of dislike) and partly because it gives one the feeling of "being pushed around". One of the remarks in 6C6 illustrates this: "Would like to return to a department where you know beforehand what the day's work will be". It might be that there is an opening for joint consultation here in giving more advance warning of changes; probably it is the feeling of being a mere pawn in the game that is really resented.

Variety

There was a general approval of variety; of 130 remarks, 47 expressed satisfaction that the

job had variety (6 B 4, 6 B 8), while 66 wanted more variety (6 B 5-6); only 17 admitted that the operator had adjusted to a lack of it. The most extreme expression of the interest aroused by variety came from a woman who had, during the War, acted as mate to a fitter on bus maintenance; that, she said, was the best job she had ever had because no two apparently similar tasks ever had quite the same actual content, and "You could never learn all there was".

The real question is what attracts the operator in variety. In the case quoted, the variety in material was so great as to make the difference almost one of rotation in the sense here defined. At the other extreme was the armature winder (Job 1): "It is never the same two days together, although supposed to be the same job and material". In this case no difference in material was apparent to an outside observer, yet the operator could sense minute differences in wire and materials, and considered that they gave some sort of satisfaction. On Jobs 21 and 22 there was an intermediate situation; change of label was apparent though it did not involve any change in working method. Generally this true variety in the defined sense was liked; a few remarks suggested that to the operator it did not seem to relieve the monotony, but they were only a few (6 B 5, 3 remarks).

The remarks complaining of monotony (6 B 6) were to the general effect that there was no variety, or too little; they were perhaps less sophisticated than those of 6 B 5, which showed a more analytical attitude. The difference may lie less in the actual task or job than in the person making it; there is a feeling of being bored and finding no good in the task: "There is no variety in any simple task, nothing you can get enthusiastic about". The sensation of constraint is present again in "Seems a long day, particularly if you are looking forward to something in the evening".

Variation in Method

Comments bearing on variation as a means of obtaining diversity occur under a number of headings. Some of those under 6 D suggest that

the less broken down tasks were appreciated partly because they allowed more scope for variation, though a commoner reason for preference was that they gave one more responsibility for making the whole of an article. 6 E deals more particularly with variation as such, and the opinion was nearly all in favour of allowing freedom to organise one's own task.

A common variation can be practised only when the task is not too much broken down: if there are several stages, the operator can either carry out each stage successively on one article and then go on to the next, or she can start with stage one on each article of a quantity, then follow with stage two, and so on. She can herself choose the size of this quantity, and, within the limit of the total number of operations per article, the number of stages performed. Thus on a task requiring six operations per article, she can do all six on each article, or operation one on each of a quantity of articles, or any combination between. A further point about this possibility of variation; it sometimes allows the operator to spend part of her time doing a sitting task and part standing.

Variation in method is sometimes bound up with the existence of team work; it can be arranged in the form of a sort of unofficial rotations of tasks, but not a true rotation. Thus one member of a team may get ahead on her allocated part of the task and help others out; this is not quite rotation in the defined sense in that there is no planned routine of changes, whether official or unofficial.

There were some suggestions for improvement of methods, a few of which had been officially accepted and put into practice already, and there was a genuine approval of good methods even where these had been imposed from above. Real disapproval was voiced of those imposed methods which were not efficient or were ill-adapted to human capabilities, particularly if they were rigidly enforced by the nature of the equipment or layout. The disapproval was not so severe in those cases where, to quote a remark, "They show you their way, but when you get good you find a better way for yourself". There does seem to be a reser-

voir of goodwill and inventiveness; but to treat the operator as an unthinking part of the working equipment, unworthy to voice ideas on methods, drives it into channels where it is not properly utilised. Worse, in ignoring the operator's views, there seems to be a risk that one can make her unwilling to accept good methods; self-expression will out, if only by deliberately using a worse method because it is not the imposed one.

Pacing

Pacing is further discussed under a later heading, 'Productivity', but in a somewhat different sense. The operator can regard speed of work in at least two ways; as a determinant of the amount of production, or as a measure of the amount of work she puts into the job. It is in the latter sense that the present remarks treat the problem.

Comments on pacing do not fall into a neat dichotomy; there are 34 comments in favour of going one's own pace (5 B 6) and 11 criticising a fixed pace (5 B 7), but also a number about the actual speed of pacing, and 25 remarks that the existing pacing was liked (5 B 5). From the point of view of demands on the worker, one may suggest that two general facts govern the situation:

Whether pacing exists or not;
If it does, whether it does or does not fit in
with what the worker regards as the
'right' speed.

If there is pacing, but it is at the 'right' speed, it may be liked; 5 B 5 shows this with such remarks as "Likes a job that keeps you going". 5 B 1 refers not so much to pacing as tempo—not strict pacing, but the general tendency of a team to keep pushing on. The difference might be compared this way; to stop on a paced job is like pulling the communication cord, whereas to hold up a job with a busy tempo is more like stopping a bus; one is serious, the other is not. Tempo is really a matter of team or individual morale; pacing is sheer mechanical force.

Pacing was really disliked when it was too fast or too slow from the operators' point of view; and what constituted too fast or too slow was governed by a number of factors. Experience was one; "Prefers a quick machine; slow ones all right to learn on, but not now" shows this. But the same actual speed may not always seem right; "Pace about right, sometimes hard, sometimes easy" clearly suggests that the operator's idea of the 'right' speed can vary from moment to moment. On the average, in this case, the operator's desires agreed with the speed set; but sometimes she would wish the speed to be slower, sometimes faster.

SKILL AND ATTENTION

The demands made by a repetitive task may be analysed into knowing what to do and being able to do it. The former is a matter of intelligence and memory, the latter of dexterity or manual ability. The relative proportions of each demand made by different tasks vary; comparison of Job 1 with Job 12 illustrates this point. Job 1, armature winding, demanded considerable knowledge of the construction of the article, and detailed knowledge of how many turns of wire to lay on between papers and silks; and although dexterity was necessary in soldering up wires, this activity occupied a small part of the total time. Job 12, carton stitching, was easy to understand; the difficulty lay in being able to do it at speed.

This matter of speed brings in a further subdivision of demands, that of skill or dexterity as a matter of 'power' or 'speed'. Some tasks, though not usually repetitive ones, demand the ability to do really difficult manual operations rather slowly, and with it the ability to adapt to new variations in the basic pattern of movement. Repetitive tasks, on the other hand, often demand that a simple pattern be repeated without variation at a high speed. Past research, a bibliography of which is given (5), has not emphasised the distinction between 'speed' and 'power'; and in practical applications it often seems that 'power'—the ability to do a difficult task—is regarded as the main

component of manual skill. Simplification of tasks aims to reduce the demand for 'power', but may increase the demand for 'speed', apparently on the assumption that the ability to work fast is possessed by most people. The remarks made in these interviews suggest that this assumption should be checked.

The knowledge requirements of a task can be further analysed into knowledge of how to do the operations, and knowledge of their importance. In repetitive work it is usually convenient to know how far a particular part of an assembly can be done rather badly, and at what point it must be rectified. This is not in order that work may be skimped; but anyone is likely to make an occasional mistake, and suitable knowledge may enable one to keep up the steady flow rather than stop to rectify a mistake that does not in fact matter a lot.

There seems to be one demand, that on attention, which is neither a matter of skill nor of knowledge. Typical of this is Job 17, ampoule inspection. Once the operator has sufficient experience—*i.e.*, when she has stored knowledge so securely in her memory that it can be used without conscious effort—the task is almost entirely one of attention; each ampoule must be looked at carefully. Attention of this type is a negative sort of activity, and seems to give rise to dissatisfaction; it is a matter of keeping one's attention away from other things. This may not necessarily mean keeping one's whole mind from other matters. The comments tend to draw a distinction between demands on attention and demands on 'skill', and suggest that interest in a task and the need for attention to it are by no means synonymous.

Skill

The earlier discussion of commoner remarks has mentioned that the possession of skill, either to be able to do a difficult task at all or to do a simple one quickly, appears to be a source of satisfaction. There is also an apparent sense of security in having a skill, and some people appeared content to rest on what they had for this reason—8 A 3 shows this with such remarks as "Likes simple task, used to worry at previous

more complicated one". There is more than a suggestion that this attitude was held by older people; many of these were part-time workers whose home responsibilities were considerable, and who did not want more than the lightest responsibility added at work. A more complicated task would add to the demands without being able to give an adequate return in satisfaction.

On the other hand, many remarks (8 A 4-5) indicated that a more complicated task would be preferred, either because it would provide more "interest" or more self-respect. Such were "Would like a more interesting task" and "Have lowered myself coming here—task too easy". Obviously there is an area between the task which is too easy and that which is too difficult; it is not the same for all operators, and perhaps not the same for one operator all the time. The remark "Task only interesting while learning it" suggested that a continuous process of rising to more skilled tasks may be an answer to the question. The difference between operators was pointed out by some part-time older women, who admitted that they themselves were satisfied but did not see that a younger full-time worker could be.

Attention and interest do not go together, but from the interviews it was not always easy to disentangle them; some operators in saying that the task required attention really meant that it occupied the mind fully, while others were capable of drawing the distinction implicit in the remark "Task needs attention, but you can think or talk". An 'interesting' task was here taken to be one which occupied the mind a good deal of the time; this was usually liked, as shown by the remarks of 8 C 4. Typical were: "Demands on attention (meaning actually cognitive processes) keep one occupied", "More interesting than previous job, need to keep your mind on it. Like this". There were 48 remarks of this type, against only 9 of 8 C 5 which suggested a dislike of the "mind-filling" type of work. The latter were of a borderline type; the dislike was in some instances not of the tasks being full of interest, but full of demands on attention; "Checking disliked, head

spins with figures" was one of these. The arithmetical work was so mechanical as to amount almost to attention rather than calculation.

Attention

Comment 8 C 2 compounds 64 remarks expressing satisfaction with tasks where the attention can be maintained more or less mechanically so that the operator can think of other things, or talk. 8 C 3 adds further remarks descriptive of the things one thinks about, ranging from planning out domestic activities (usually the part-time married women) to dreams of winning on the pools. It has long been recognised that two types of repetitive task are usually tolerable; those demanding thought, such as have been mentioned above, and those demanding only mechanical attention so that the mind is left free (6). One or two remarks, however, threw further light on this latter class of task; that it can get boring if one runs out of subjects to occupy one. One older woman said "It must be boring for young girls; they seem to have nothing to think about". This may be so; or their limited range may be suited to their mental capacity; but at all events one must bear in mind the possibility that an operator can run out of subjects.

That mind wandering can engross one was shown by one remark "... it needs so little attention, I go right away; sometimes I come to and I am surprised to find myself still working". One may ask if it is reasonable to expect human beings to work under these conditions; does adaptation to the task in this fashion have an undesirable effect on the person's adaptation to life in general? (7).

PRODUCTIVITY

Remarks bearing on productivity have been classified in Appendix III under a number of headings; this discussion attempts to relate them under a few general notions:

- Getting out quantity, working efficiently.
- Maintaining quality, being interested in the final product.
- Knowing how much one has done.

Working Efficiently

"Give us the tools and the material and we will turn out the stuff" would fairly summarise the attitude to production shown in most of the interviews; or, put another way, "since we are cooped up here for a considerable period of the day, let us get on with what we came here to do". Materials, machines and equipment, and organisation and methods are determinants of production efficiency, and, of course, morale, but that is assumed and the present discussion is of the effect of the former items on it. The relevant comments are in sub-headings 2 A, 2 C, 2 D, 5 A, 5 B 1-2, 6 G.

The comment containing the second largest number of remarks is 2 A 3, "Dislikes hold-ups due to poor material or difficult material"—109 remarks. There are, of course, comments also that mention a liking for material or machines to run well, 5 A 1-2, with 32 remarks between them; but it is interesting to note that trouble was criticised more than lack of it was appreciated. Partly this is a normal human tendency, but there may well be more to it. Management, in taking the responsibility for equipment and usually for methods also, lay themselves open to being regarded as 'they'; the operator's attitude becomes passive. "They told us to do it like this; it is up to them to see that we are not held up"; this remark was not actually made, but summarises the attitude engendered by detailed production planning when the latter fails to pay due attention to the worker's needs and views. This point is further illustrated by comments 5 A 1-2, dealing with good or bad work flow as it is affected by organisation rather than machines and material; the dislike of poor flow was more often mentioned than the liking for good flow. Good flow was accepted—and rightly so—as the proper thing.

It is often said that piece rates or direct production bonuses are the real way to get high output; certainly they may help. But on the remarks made in these interviews, the time rate workers were no less stringent in their criticism of low working efficiency than the others.

"Everyone likes to be kept working" and "Waiting during stoppage makes me feel guilty" were said by women paid on time rates.

Matters of pace have already been referred to; there is some dislike of a fast pace which might seem to conflict with the apparent desire to turn out plenty of production. To the operator there seems a balance to be struck between effort put in and results achieved, effort being represented by the demands of pacing. A slow pace can be an annoyance in itself, an annoyance which is reinforced by poor results; pace can become annoying when it gets too fast, but at least the resulting high production provides a satisfaction. The particular dislike of bad material could be explained in this way; extra effort must be put in, yet less output results. The balance which is struck between effort and output is likely to vary between individuals, and could be taken as one way of expressing motivation in work.

There were relatively few remarks in sub-heading 6 G referring to the methods which were in fact imposed. This was perhaps less a reflection on lack of operators' interest than of the attitude that planning and methods were the province of management; operators tended to accept the idea that criticism was something of an impertinence.

Quality

Under this heading are considered matters a little broader than merely turning out an article up to the recognised standard; questions of satisfaction in producing a nice-looking article, and of being responsible for what is made. Reference is made to the heading 9 of Appendix III as well as to sub-headings 2 B and 6 D.

One may draw a distinction between the appearance or feel of the material and the difference which the worker makes to it, a difference which is illustrated by remarks from 2 B and 9 A. Typical of the former was "Some of the cartons are nice to look at when made up", and there were other remarks on the nice look of cellophane packages, and "Satin and crepe nice to work with (on previous

job)". The latter remarks were of the type "Feels proud when other people see how tidily she keeps her files"; they expressed satisfaction, not in working with nice things, but in doing a good job with things not intrinsically attractive.

In both cases, there are comments expressing dissatisfaction as well as satisfaction, but the latter are in the majority. The sort of task causing dissatisfaction was that where one did not see much change in the material as a result of working on it, or a change for the worse. Remarks in 9 A 2 illustrated this; "Can't admire my job, just a means to an end", and, speaking of scrap disposal, "Dislikes making a mess of boxes instead of making them up".

There is some evidence of conflict between quality and quantity; "... Thinks it is difficult to maintain quality at the speed asked for" in 9 B 2 shows the type of remark. There were remarks appreciative of the high standard expected (9 C 1); there was none suggesting a lowering of standard, merely those which suggested that it was difficult to maintain it at speed.

Quality introduces considerations of the use to which the product is to be put, and the way in which one operator's task can affect intermediate stages of manufacture. A number of remarks were made on these points—9 C 3 9 E and 9 D. These showed a considerable interest in how one task fitted in with others: "Most of your work depends on whether the person before you has done her work properly" (9 C 3) and "Interested in export packs—likes to know where the work goes" (9 E 1). A considerable number of people wished they could see more of the factory as a whole (39 remarks, 9 D 2); a few had a pretty comprehensive knowledge and were glad of it, and a very small number (4 remarks, 9 D 3) were not interested. The general trend of remarks under sub-heading 6 D was similar; the main reason expressed for liking a 'whole' rather than a broken down task was that one could see that one had produced something. In a broken down task one tended to lose sight of

the end-product in keeping up with the pace of producing the particular part.

Knowledge of Output

The general preference for unobstructed working has already been mentioned; allied to it is knowing how much work one has done. The liking for steady fast work shows in two ways; an enjoyment of the fast tempo itself, and satisfaction in having turned out plenty of production. The latter satisfaction must depend on a knowledge of progress, though the former need not. Comments under sub-heading 5 C refer to such knowledge; and out of 122 remarks, only 13 failed to show a lively interest in rate of output. Even of these, several suggested not that the operator was disinterested, but that there was too little information to allow her to know how things were going.

Targets played a part in the remarks, either the official target or a self-set target; and competition with other teams or machines was mentioned. "Some excitement at end of week to see if schedule has been met": "Setting oneself a high target distracts one from depression": "I like to beat the person next to me". Failing other sources of interest, one can find some satisfaction in mere volume of output (8, 9, 10); but it is necessary to note in these remarks the implicit assumption that it should be under the operator's control; in a purely paced task this satisfaction would not be found. Even where there is an official target, the pace can still be left to the operator and there can be satisfaction in making the total; there is still an element of 'freewill'.

ORGANISATION AND TEAMWORK

Relations with fellow workers, although mainly a matter of social environment, are connected with the way the task is organised; for example, a press operator works alone and is often cut off by reason of noise from other nearby workers, while those in a team are forced into close proximity. Some of the relations in-

volved are mainly social, others are particularly connected with work. On the social side, workers near together can talk but are not necessarily working as a team—that is, they may work as individuals and contact between them is a matter of enjoyment, not being essential to the task. Interpersonal relations in a team working as a unit cover this type of contact and another as well: the contact necessary to co-ordinate the tasks. Typical of them is the occasional call to a supply girl for fresh material. The two types are referred to as 'social' and 'working' contacts respectively.

Social Contacts

Many remarks were in favour of work so organised that social contact was possible, or recorded a dislike of the opposite condition. Such were: "It's the company rather than the task that cheers you up", "Lonely on a press by herself". There were more than 100 such remarks, and only 20 in favour of working on one's own. One may expect personality differences to be reflected in workers' views on this point.

A fair number of remarks showed qualified approval of social contact. There was a feeling that teams were better when composed of people of more or less the same age; this was expressed by both old and young workers. (One understands that subjects of conversation at varying ages have little in common.) A few people liked social contact so long as one could keep in the same group; "Does not like being put in a team of strangers away from friends" is an understandable reaction; one must bear in mind that it may involve close and continuous contact for up to nine hours in the day. The remarks of 6 A 10 were relevant to this point, being of the type "Difficulty was in getting used to the team, not the task". The dislike of too much change of task, referred to earlier, was often based on the accompanying insecurity of the working group. Rotation of task, on the other hand, keeping the group intact but changing their tasks, tended to accentuate the security of a well-integrated group.

Some of the remarks of 1 A 4 on posture had a reference to social contacts. The preferences for a task which involved some moving about usually mentioned it as a break, or as a rest from sitting all the time; but a few admitted that it was nice to be able to go and talk to people in another part of the room now and then. From general observation, one might say that this is a very valid attitude, often expressed in action.

Working Contacts

Remarks of this type tended to stress morale. Comment 6 A 8 stresses the desirable features of good teamwork in such remarks as "Good team: will help you out if you are pushed". 6 A 9 deals with the opposite situation: "Some nattering in this group, a few do not work hard". The difference between social and working relations is shown clearly by "Complaint that other girl never helps, though nice". The effect of physical methods is shown by "Liked previous job on conveyor belt, everyone had to do their share"; this raised an interesting comparison.

Where morale is good and the group members can trust each other, it is regarded as a good thing that all do not have to work at the same rate, but can help each other out now and then; yet if there is any suspicion of slacking, some enforced share-out of work is liked. The remarks on pay in 12 B 2-3 emphasised this difference, some people preferring individual bonus payment, some a group scheme. A group scheme was easier to administer since it reduced recording and paper work; some of the administration was in effect left to the group itself.

The remarks gave an indication that a group capable of arranging work to suit the capacities of its members at a particular time was more satisfying—and probably more effective—than one in which fair shares had to be enforced. Any forced method, such as a conveyor belt, apart from introducing a constraint, shares out the physical quantity of production; perhaps a truer share is the amount of effort put in. An individual at one time may find each piece costs

more effort than at another time; the real fair share in such a case would be related to effort put in rather than production got out.

Responsibility for the work of the team appears in comments under various sub-headings, for example 5 F and 9 C 3. The former concerns difficulties due to poor balance of teams, throwing uneven work load on to various mem-

bers; the latter concerns quality responsibilities to other team members. Typical of the latter was "Most of your work depends on whether the person before you has done the job properly". There was a fair balance between the attitude "I depend on the job before" and "The job after depends on me".

CONCLUSIONS

This study was undertaken to find which aspects of the organisation of repetitive work seem to afford the worker satisfaction or to cause dissatisfaction; and if possible to indicate lines on which experimental investigation could usefully follow up the preliminary indications. A study such as this, while covering a wide field, cannot by its nature do more than suggest hypotheses; experiments to test such hypotheses would be a second stage. The findings are briefly summarised in the following paragraphs and their implications are discussed as a preliminary to consideration of what further work might be attempted.

SUMMARY OF RESULTS

The job studies show that one can observe the existence of certain features common to many jobs—rotation of tasks, variety in material and so on; the interviews suggest that these features, or some of them, are of importance to workers. The more relevant ones appearing in this study

are:—

Diversity in the work: the extent to which there is change or rotation of tasks, variety in the material, opportunity to vary method or to alter one's pace.

Attention demanded by the work: the extent to which work demands close attention or allows the worker to think of other things; also the extent to which the work provides sufficient interest to make attention easily given.

Skill demanded by the work: the difference between 'speed'—the capacity to do a simple task quickly, and 'power'—the capacity to do a difficult task at all.

Efficiency: how far the work is organised so that the operator can produce plenty, and can know how much has been produced; whether there is a conflict between quantity and quality.

Teamwork: the difference between the team as a social unit and as a working unit.

Physical Conditions.

Some of these aspects of repetitive work may best be considered together under three headings which seem to cover their impact on the worker: freedom, security and creativeness. In the ensuing paragraphs these are dealt with first, and there follows a discussion of any matters which cannot conveniently come under these three headings.

Freedom and Constraint

Some degree of constraint is common to all work, and in fact the presence of an element of constraint has been used as a criterion of whether an activity is or is not work (11). Repetitive work often appears to be organised so that this element of constraint is greater than it need be, and the evidence of this study suggests that such unnecessary constraint is resented—or alternatively, that any relaxation of it is appreciated. The factors referred to above under 'Diversity in the work' bring an element of freedom to the operator, and to that extent are a source of satisfaction. Variation in the method allows some freedom of choice to an operator; variety in material, rotation and change of task, while not allowing choice, are said to make time pass more quickly—*i.e.*, they seem to reduce the period of constraint.

Some comments on attention are relevant to freedom and constraint. Attention involves looking or listening or otherwise using a sensory apparatus to watch for a cue; the psychological interpretation of the cue, or the 'set' needed to attend to it, may be at various levels. It may demand sufficient concentration to preclude other mental activity, and thus form a constraint; or it may depend on a cue which is so obvious that the operator's mind can hardly fail to miss it and can thus be free to consider other things. This freedom was appreciated by operators who had opportunity to talk, who could occupy their minds with other thoughts, or seemed content to have a more or less unoccupied mind. Attention is not fully dealt with here, as some of its aspects are not entirely

relevant to freedom and constraint and are considered later.

Pacing by machine, conveyor belt, other members of a team or any other method is in effect a constraint, and comments suggest that some people disliked it. Others liked to feel some control which kept them going, so long as it was at "about the right speed". Possibly the slight constraint gave a feeling of security. A few casual remarks (not collected as part of the interviews, and so not quoted with them) threw an interesting light on monetary incentives; operators in certain cases liked a paced task, as it ensured them a high enough speed to earn a reasonable bonus; without the pacing, they feared their own desire for pauses would reduce earnings.

Security

Some comments must be interpreted as showing the need for emotional security in the work; such are the dislike of too frequent or too random a change of task, and the dislike of joining a strange team. Perhaps the desire for security sometimes runs counter to the desire for freedom, as in the case above where pacing is liked. In many cases presumably a balance must be struck between security and freedom, but it is worth noting that some ways of organising work reduce both to a minimum. The 'pool workers' system already referred to involved frequent changes which denied security in an arbitrary manner allowing little freedom.

Possession of skill gives a sense of security; this has long been recognised in the accepted trades, where a man serves his time and acquires status as a 'skilled man'. But even in the lesser skills and knacks of repetitive work there is satisfaction in being able to work quickly and effectively (and often a dislike of moving to an unfamiliar task where one has less skill); at a slightly higher level there is the satisfaction of being able to do several tasks at an acceptable speed. It is often suggested that this is primarily a matter of being able to earn more; but the satisfaction is apparent even where pay is not related to output.

Creativeness

This study bears out the idea that there is a satisfaction in "seeing the results of one's efforts", and that it may take various forms. The most obvious is that of turning out plenty, but there are others: making good quality articles, or feeling that one has contributed towards a final product that is socially useful, or at least is greater than the sum of the rather unrecognisable bits handled by oneself and one's colleagues.

The dislike of having one's creative efforts frustrated is clearly shown by the many criticisms of hold ups, bad methods, slow pacing and so on. That all the studies were carried out in 'enlightened' firms may be relevant; it could be that in other organisations the attitude to production would be less positive. But it is clear that when the general morale is good, or fairly good, high productivity is expected by the worker; there is a will to work which needs no artificial stimulation, but rather the removal of obstacles so that it can be expressed in action.

Demands on Attention

The varying depths of mental activity demanded by the task have been mentioned above and are discussed elsewhere (6, 12). The lightest demands—mere superficial attention—allowed the operator almost complete freedom to think of matters outside the job. Often this was liked, but sometimes it was not. Part-time workers, married women with homes to run, usually preferred this type of task; it gave them a physiological rest (if it were a sitting task), allowed them a chance to talk to others, and an opportunity to plan the domestic side of their lives—to them, the more important side. They often said that such simple tasks would be boring for younger women, doing it all day and with less outside interest to occupy their minds.

Yet the latter were frequently content to do such simple tasks; they did not complain of being bored, though several admitted to a great deal of day-dreaming. If one could find sufficient people who could exist happily with a

more or less blank mind for long periods, or could occupy their minds on little material, such tasks would not entail boredom. But, knowing that many people are not of this type, it seems unwise to plan work on the assumption that there is an unlimited supply of those who are.

Some workers preferred a task which, although it made quite heavy demands on attention, was interesting enough to hold that attention without undue effort. Obviously there are individual differences which make the same task "interesting" for one person but "too hard" for another.

Demands on Skill

The recurring remark "There is no skill in this job except doing it fast" suggests that one might consider manual skill from the standpoint of 'speed' and 'power' as separate factors. In some industrial tasks there is little skill in the sense that one can learn to do them in a matter of minutes; yet experienced operators can do them at a speed that the newcomer takes days or weeks to acquire. Other tasks—one might instance precision filing and fitting—take weeks to learn; even after mastering any cognitive problems as to what is to be done, the actual doing can only be learned slowly. It may be that there are factors, psychological or physiological, which are related to 'speed' and 'power' in this field; in past research on manual skill there has been little attention given to this possibility.

Teamwork

Much work has been done on the study of working groups as social units (13), and perhaps it has tended to obscure the fact that such groups exist for the purpose of working. Interpersonal relations are important and can affect work; but this study gives the impression that most people recognise the overriding need to produce and are willing to absorb a certain amount of friction in order to keep the job going.

Physical Conditions

The chief conclusions in this field are that existing knowledge is often not fully utilised; the remarks in favour of a task that allows alternate standing and sitting reinforce findings which by now should be common knowledge (4). The various criticisms of heating and ventilation were not serious and can be summed up in the saying "One man's draught is another man's ventilation" (14). This individual variation in requirements, not easy to cater for in heating and ventilation, might be the subject of more attention in other ways such as the design of chairs, benches and machinery positions; managements tend to fall into the common error of providing what the average person is expected to want rather than what the individual does in fact want.

THE FIELD FOR FURTHER WORK

This study was intended to clarify the questions which should be asked about repetitive work rather than to provide answers to them; to ensure, in fact, that as far as possible further work should be directed towards definite and relevant problems. The more outstanding of these are referred to below.

Freedom and Constraint

All work introduces an element of constraint, but repetitive work is often so organised as to cause more than the unavoidable minimum. Can it be demonstrated that

- (a) there is a relation between degree of constraint and satisfaction or output?
- (b) there are observable differences between individuals in the degree of constraint which they can tolerate: differences which, if predictable, would enable selection for repetitive tasks to be made more precise?

Freedom and constraint are used here in relation to aspects of work organisation such as have been referred to—variety, rotation of

tasks and so on; it seems more logical to consider them together in this way than to attempt a separation at this stage. An experimental approach might eventually be made to this problem, with the co-operation of managements and production executives sufficiently interested, but would need careful planning. It is suggested that as a preliminary, the method of studying existing situations should be developed.

In a reasonably large organisation employing people under similar conditions as regards management and personnel policy there often exists a wide range of repetitive task which show differences in the amount of freedom they allow the workers. A study of the tasks in order to rank or rate them in terms of constraint, together with a study of satisfaction as indicated by absenteeism, labour turnover and other criteria as well as by the workers' views, should be undertaken. Criteria of output as between one task and another might be possible, though open to obvious objections.

Security

The questions here are more or less parallel with those concerning freedom and constraint: how far does security or lack of it affect satisfaction and output, and what individual variations are there? The general approach to the problem might be similar also; but it would seem that in assessing individual variations a psychiatric technique would be needed — as indeed might be the case in regard to individual variations in tolerance of constraint.

Creativeness

The expressed satisfaction with methods which allow an operator the opportunity to turn out plenty, methods which minimise hold-ups, was so clear as to need little further demonstration. This need not mean, however, that the task organisation giving the highest output is always the most satisfying; the emphasis is on allowing the operator to produce, and on eliminating hindrances. An enforced raising of

output by faster pacing might correspond to a reduction in satisfaction.

It sometimes appears that there is a conflict between those who regard high output as the criterion of what is desirable in work and those who consider that the satisfaction of the worker is more important; yet, on the other hand, there are those who hold that "a satisfied worker turns out most". Evidence on the relationship between satisfaction and output is scanty; common experience would suggest that it is by no means a simple one.

Pace of Working

How far a predetermined working pace is a constraint depends not only on what that pace is, but also on what would have been the operator's pace had he or she been free to choose. In considering what is a normal pace, one must take account of the variations in pace; it is desirable to examine the extent and pattern of this variation, and to find how far (if at all) it is related to motivation.

Past work has mainly been based on measuring the differences in output over equal periods of time—periods usually of not less than five minutes, often more (15). Statistical treatment of results is easier if the time taken to do equal amounts of work (the obvious unit is one item of production) is measured, and recent developments in recording devices make it possible to carry out such measurements. These should be made at first on work which is done at the operator's own pace in order to examine the pattern and extent of what may be taken as normal, unconstrained variation in working rate.

Demands on Attention

It is in this region that one might reasonably speak of 'boredom' and 'monotony'. Tasks demand attention of varying depths, leaving

more or less of the mind free to think of other things. At the same time, tasks differ in the extent to which some factor which one may refer to as 'interest' enables attention to be given with less or more effort. A task demanding a minimum of attention and providing little interest may not be 'boring' if the operator can, by talking or other means, keep his or her mind occupied. Present practice seems to assume that there is an adequate supply of people who can keep their minds occupied on very little; one question to be settled is whether this is in fact the case.

Further points are the possibility of providing an antidote to boredom by making the task more interesting, or by providing outside interests; one illustration of the latter was provided by the part-time married women, who had already sufficient outside cares to make simple tasks a pleasant respite.

Possibly much of this problem of attention may be best dealt with from the laboratory angle in the first place; one might suggest that much of the work on span of attention is relevant (16), and that the field investigator should attempt to confirm the laboratory findings under conditions of ordinary working and motivation.

Demands on Skill

The difference between 'speed' and 'power' in manual skill, already mentioned, may be demonstrated by the use of appropriate tests. Two sets should be used: the first would be tests of sheer speed, such as key tapping, turning a handle, and so on; the second set would be tests carried out with no time limit, the subjects being given a series of tasks of increasing complexity, finally reaching a point where the task would become impossible. If 'speed' and 'power' are separable components of skill, statistical analysis of such test results should demonstrate the fact.

DETAILED study of working methods and efficiency was begun by F. W. Taylor about 1880; the case of "Schmidt" handling pig iron is now classical (17). Taylor was a practical man and an engineer, and he got results; those who followed him have got results too, but the law of diminishing returns seems to operate here as in so many other cases. Work itself has changed (partly as a result of the activities of such men as Taylor), and the social climate has changed.

In those early days much repetitive work—though not by any means all of it—involved sheer hard muscular effort, and an approach which combined some physiology with a good deal of engineering commonsense was bound to increase output, earning power and satisfaction. Nowadays, mechanisation has reduced effort on the worker's part to a minimum (or even below a satisfying minimum sometimes?) and the enemy of production is not so much fatigue in the physiological sense as boredom or dissatisfaction with the task. The same approach which took the sweat out of work may not suffice to remove subtle psychological influences which hold back productivity; in fact there are indications that it may reinforce such influences. The modern production engineer must bear such matters in mind, remembering that the operator is, like all humans, illogical in parts.

In earlier days, too, motivation to work was simpler; unemployment meant, if not starvation, something uncomfortably near it. But under full employment motivation to work means something more complex than merely avoiding dismissal. This has been recognised already by employers who seek to provide good general conditions, good supervision, and so on. Repetitive work has often, in this context, been regarded as a necessary evil; yet, as this study suggests, its dissatisfactions can be minimised and it can, if so organised, provide positive satisfactions.

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IFRB—Industrial Fatigue Research Board.

IHRB—Industrial Health Research Board.

APPENDIX I

FORMS USED IN JOB STUDIES AND INTERVIEWS

ORT 1/2 Part 1

CHECK LIST FOR JOB STUDY IN REPETITIVE WORK

PART 1 — GENERAL INFORMATION ON FIRM

1. TYPE, SIZE, LOCATION

INDUSTRY

FIRM

MAIN OPERATING DEPARTMENTS

(1)
(2)
(3)
(4)

LOCATION

Nos. Employed—

ESTABLISHED

Men

YEARS

Women

.....
.....
.....
.....
.....

Total Employees (all Departments)

2. GENERAL EMPLOYMENT CONDITIONS

RECRUITMENT AND SELECTION

Area of recruitment/all local/most local/many from distance.

Part time workers employed? Yes/No.

If yes, in which departments?

What tests (if any) are used for selection of workers for operating departments?

Are new workers employed for a probationary period? Yes/No.

If yes, how long is this period?

How difficult is it for workers to get jobs in the district?

HOURS OF WORK AND HOLIDAYS

Days per week

Hours per day

Hours per week

Shift arrangements

Holidays

WAGE SYSTEM

Method payment Time/Bonus/Piece

Guaranteed minimum week? Yes/No. If yes, how many hours?

General level of earnings Men Women

General level of earnings compared with other firms in area—higher/same/lower.

Are merit payments made?

TRANSFER AND PROMOTIONAL OPPORTUNITIES

Are there recognised job hierarchies in each department for promotion purposes? Yes/No.

Is transfer possible within departments? Often/seldom/not at all.

Is transfer possible between departments? Often/seldom/not at all.

Does redundancy often arise? Yes/No.

What is the firm's policy?

LABOUR TURNOVER

Annual rate of labour turnover

Men

Women

Total

Department	.....	.....	.....
.....
.....
.....
.....

JOINT CONSULTATION AND EMPLOYEE SERVICES

Has the firm

- (a) Works Council or Committee. Yes/No. Elected/nominated.
- (b) Suggestions Scheme. Yes/No. If yes, are awards made?
- (c) Pension Scheme. Yes/No. Qualifications.
- (d) Scheme of sick pay in addition to National Health
- (e) Yearly, or half yearly bonus; or profit sharing
- (f) Canteen
- (g) Social Club

Other notes on employee services and amenities.

CHECK LIST FOR JOB STUDY IN REPETITIVE WORK

PART II— JOB INFORMATION

SECTION 1 — GENERAL

JOB TITLE				Department.		
NUMBERS EMPLOYED	Full Time	M	B	W	G	Total.....
	Part Time	M	B	W	G	Total.....
CLASS	A					
	B					
	C					
	D					

SOURCE OF RECRUITMENT AND METHOD OF SELECTION

From outside/other departments/other jobs in department.
Tests used, or acceptance standard.

TRAINING

In training department. Yes/No. If yes, how long?
On job. Yes/No. If yes, by whom and for how long?
Pick up by watching others. Yes/No. How long before able to work alone?
How long to earn bonus or exceed time rate by piece work efforts (*i.e.*, to become proficient)?
How long to become experienced?

Hours

Days per week Hours per day Hours per week
Rest Breaks Meal Breaks
Overtime — often/seldom/none.

PAY

- How is job paid? Time/bonus/piece.
- If time, what is basic rate? What is range of rates in department?
- If piece or bonus, what minimum is guaranteed?
- What is standard (to earn piece or bonus)?
- Range of speeds compared with standard
- Range of earnings on job in department
- How are workers paid during training?

PHYSICAL ENVIRONMENT (PLANT CONDITIONS)

SOCIAL ENVIRONMENT (PLANT CONDITIONS)		other remarks
Temperature	— Comfortable/uncomfortable;	
Ventilation	— Satisfactory/unsatisfactory;	other remarks
Illumination	— General — adequate/inadequate Local — adequate/inadequate.	
Housekeeping	(cleanliness)	
Hazards	— Safety Health	
Unpleasant features	(noise, smells, etc.)	

SOCIAL ENVIRONMENT

Team/individual Size of team
Group/isolated Size of group
Contact with others
Prestige of job c.f. with others in department — high/average/low
Reason:
Supervision — close/easy
Talking is allowed — officially/unofficially/not at all
Smoking is allowed — officially/unofficially/not at all
Singing is allowed — officially/unofficially/not at all
Music while you work Yes/No. Times:

LABOUR TURNOVER AND REASONS FOR LEAVING

Turnover (Annual Rate) *Men* *Women* *Total*

SECTION 2 – PERFORMANCE AND ORGANISATION OF TASK

DESCRIPTION OF DUTIES (Indicate if vary during day or from day to day)

MATERIALS, TOOLS AND EQUIPMENT USED

Materials (kind and variety)

Tools

Equipment (Jigs, Machines, etc.)

(Sketch of Layout overleaf)

SEQUENCE OF OPERATIONS (Degree of breakdown)

Approx. time of different parts of job

A decorative horizontal line consisting of a series of small, evenly spaced dots, centered horizontally on the page.

A decorative border consisting of three horizontal lines, each marked with a series of small black dots.

Can worker vary sequence of operations or layout of work place? Yes/No. If yes, how?

Differences between workers in method of doing job

Learner difficulties

NATURE OF SKILL

Manipulative Ability

Nimble fingers / specific knack / steady hands / delicate touch / ordinary accuracy / coarse movements.

Nature of attention and control

(a) Demands on attention are continuous, and require intermittent concentration
and need a fair amount of thought attention to a number of things,
little or no

(b) Control is mainly

- visual requiring very good / good / ordinary vision
- tactile
- auditory
- kinaesthetic or proprioceptive

Rates of working

Depends upon speed of reaction to a stimulus. Yes/No.

Depends upon operatives' manipulative ability

Is governed by quality considerations

Mechanical Ability

Is needed for the job itself / is a help in machine adjustment / is not required

RESPONSIBILITY FOR QUALITY

What check does operative make on quality of components used?
assembly made?

Is work checked at a later stage?

OTHER RESPONSIBILITIES

Can operator mistakes be costly, of materials, tools, equipment, or result in personal injury or injury to others?

PHYSICAL DEMANDS ON WORKER

Position Standing / sitting / stand-sit
Any stooping, lifting, or reaching?

Parts of body used one hand mostly, both hands equally, one foot, both feet

Posture and Freedom of Movement

Sequence of operations allows for frequent changes / maintaining same posture for long periods

Is layout such that awkward postures must be maintained? Yes/No.

If machine job, can machine be left? running / stopped / only by special arrangement for relief

Does worker leave job to get supplies? Yes/No. How often?

Physical Effort

Job is heavy / medium / light

In terms of effort required, could layout readily be improved? Yes/No.

Pace of work and efficiency

Pace set by machine or conveyor or team member and output depends mainly upon machine or conveyor running time or speed of pacemaker

Pace set by machine or conveyor or team member and output depends upon operator's working speed

Machine job (hand operated)—pace and output depend upon operator

Wholly hand job—pace and output depend upon operator

Comments**ORGANISATION OF WORK****How is supply arranged?**

Layout ensures continuous supply brought to workplace

Supply of materials brought at regular / irregular intervals by service hand

Operator brings own supplies

How is work removed?

Continuously by conveyor

In batches at regular / irregular intervals

In batches at end of work period

KNOWLEDGE OF PROGRESS**How can worker keep check on amount of work done?****Do workers keep check on amount of work done?****Is output information recorded by operatives? Yes/No.**

At regular intervals / end of work period / not at all

LOST TIME

Bad flow of supplies — often / occasionally / very seldom

Machine stoppages — often / occasionally / very seldom

Defective quality from previous operation — often / occasionally / very seldom

Defective quality made in this operation.

VARIETY WITHIN THE JOB

In materials used

In number of operations performed (i.e., number of job elements)

Introduced by number of 'lines'

Introduced by organization (e.g., batch size)

Introduced by operatives on methods of doing the job

Other remarks

SATISFACTIONS AND DISSATISFACTIONS

(Expressed during job study only)

Popular grouses

Favourable comments

ORT 2/2

INTERVIEW PROCEDURE: SATISFACTION IN REPETITIVE WORK

1. GREETING

By name; offer seat.

2. EXPLAIN

Self, N.I.I.P. "I expect you would like to know more of what this is all about. My name is and I belong to the National Institute of Industrial Psychology. Our job is to study problems of people at work."

3. THIS INVESTIGATION

"What we are doing here—as well as in other factories—is studying certain kinds of jobs; the sort of jobs that are done over and over again. There are probably some two million people in this country doing them; some of those people like their jobs, and others don't. We want to find out more about such jobs so that we can try to make them better suited to the people who do them. This kind of work suits some people but it doesn't suit everyone; and if only one person in twenty doesn't like his (her) job that means a hundred thousand people who are more or less dissatisfied, not working as well as they might, nor earning all they could. Both these are important points; the country needs more production, and most people want more money. We want to know more about it all, and to find out we must ask the help of you and people like you."

4. INDEPENDENCE OF FIRM

"This work is only one of a number of investigations which are being made throughout British industry at the request of the Government, and with full support of the Trade Unions. It is not something which this firm asked us to do. We asked the management here if we could see some of the many jobs which are done in this factory and talk to the workers doing them; this they have kindly allowed us to do."

5. CONFIDENTIAL NATURE OF INTERVIEW

"I shall not tell anyone else in the factory what you tell me, unless you want me to. But if during my enquiries I come across anything that management can do to improve conditions for you as well as for themselves, I think I ought to tell them about it. Only let me say again that I shall do this so that no one can find out who mentioned it to me. And anything that you don't want me to pass on, I shall keep quiet about."

6. QUESTIONS AND NOTES

"Have you any questions to ask me before we start? I shall be taking notes so as not to forget anything you tell me."

Note of questions asked to go on ORT 3/2, bottom of p. 1.

7. BIOGRAPHICAL DETAILS

This data need not be collected at any particular point in the interview, but as seems tactful. Explain why it is needed. We require:

How long with firm.

How long in this job.

Supplementary: Why did you change to this job?

What previous jobs

Why did you move?

Supplementaries: on job preferences if it seems a good idea to ask. If list of previous jobs is very long it may get a bit sketchy.

Home circumstances with a view to importance of money:

Married

Dependents

Other people in family earning.

Details to go on ORT 3/2 at top of p. 1. Check details of length of service with foremen or others when it seems desirable.

8. JOB DESCRIPTION

"Now about the job." Read the parts from ORT 1/2, Part II, 'Physical Environment' and 'Performance and Organisation of Task'. Need not read it just as written, but put into suitable words. Use it as a stimulus to comments, and use follow-up questions as desired.

Record on ORT 3/2, p. 2, top part.

9. JOB CARD STIMULUS

Explain that you want the person's own ideas about the job itself—what she does, rather than about the firm generally. "To give you an idea of the sort of things I want to hear about, I am going to spread out a dozen or so cards". (Shuffle and spread cards 11 to 25.) "I want you to talk about them in any order you choose, so it might be as well to read all through them first". After a pause for reading, "You will have more to say on some than on others; maybe you will want to start on those". As she finishes with each card, pick it up. When she runs out of spontaneous comment, prompt her to comment on what is left.

Record on ORT 3/2, p. 2, bottom part; put letter of card in L.H. margin, and keep chronological order. Separate comments on cards which she started spontaneously from comments which required a prompt; draw a line under the former before proceeding to the latter. Follow-up questions should be restrained and should keep to elucidating matters of fact unless there is a really hot scent to chase.

10. QUESTIONNAIRE

If the answer to any of these questions is already available from earlier parts, omit that question. "I wonder if you would mind trying to answer some questions about the actual job you do?"

(The questions 1 to 12 mentioned in the text followed here.)

Record on ORT 3/2, p. 3. Question no. in margin, answer in centre, follow-up question and answer on right.

11. CARD RANKING

"Coming back to the other things—the sort of place this is to work in, wages and so on. I have some more cards here." Shuffle and spread cards A to L. "Will you look at them all and then say which is most important to you." Let her pick out the most important, then ask for the least, and work inwards.

Record order on ORT 3/2, p. 3, bottom. Note any worthwhile comments arising.

12. CONCLUSION

Thank worker.

13. SELECTION OF SAMPLE

Where it is not convenient to interview all the people on a particular job, it is necessary to sample. This should be random, except with respect to length of service, and in that respect should be representative of the whole population. As a check, it is desirable to record (on ORT 1/2, Part II, back of 1st page) the lengths of service *in this job* of all the workers involved, then to indicate which were interviewed.

ORT 3/2

ANSWER SHEET FOR INTERVIEW PROCEDURE

FIRM.....

Para. 7

Name Male / Female

Length of Service: (a) with firm
(b) in present job

Previous jobs:

<i>Job</i>	<i>Training Received</i>	<i>Reason for Leaving</i>
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Married / Single

Dependents and other wage earners at home

Para. 6

Questions asked by subject, and note of discussion if any.

Para. 8

Comments on Job Description

Para. 9

Comments on Cards 11 - 25

Card No.

--	--	--	--	--	--	--	--	--	--

Para. 10

Question
No.

Answer

Follow-up of question
and answer

--	--	--	--	--	--	--	--	--	--

Para. 11

Ranking Cards A - L

1	2	3	4	5	6	7	8	9	10
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Comments—see other side

APPENDIX II

JOB DESCRIPTIONS

Six factories are referred to, and thirty-five jobs. Each factory is briefly described in order to relate the jobs to the general conditions under which they were performed. Factories are numbered 2, 4, 5, 6, 7, 8: Nos. 1 and 3 were involved in the pilot runs, whose results were rejected as being not truly comparable with the remainder. Factory 8 was actually the offices of Factory 7, as mentioned in the text.

FACTORY NO. 2: ELECTRICAL GEAR

This factory was a small branch of a much larger organisation, making the same type of products but in a smaller range of varieties. It was established in a mining area on the fringe of a general industrial conglomeration of towns, some 20 miles from the main factories of the company. It had been going only 8 months, drawing operatives from local people but staffed with managers and key men from the main organisation. The situation was such that labour was easier to find in this area than at the main factories.

There were 140 women employed, 14 being part-time workers, and about 10 men on odd jobs. Payment was by a bonus scheme based on production, with a guaranteed minimum; rates were the same as those of the main factories for the same work, subject to an easing of rate for learners. At the time of our visit, many workers thought it very difficult to attain bonus speed, and some were of opinion that it was better to work comfortably and be content with the minimum rate. Some jobs were in any case paid at daywork rate.

Two jobs were studied, magneto armature winding and dial printing; the former might be split into primary and secondary winding, but is dealt with as one since the two are similar even though done by different sets of people.

Magneto Armature Winding. Job 1

In secondary winding, the operator took an armature some 5 inches long by 3 inches diameter, fitted it between the 'live' and 'dead' centres of the Douglas winder (similar to lathe centres) and made ready to wind. She taped the primary ends down, leaving one piece on which to solder the secondary winding; the primary was of japanned wire (22 to 37 gauge) which, while thin, was thick relative to the 46 gauge secondary wire; the latter was very fine and difficult to handle. This fine wire was threaded round the tensioning device and soldered to the primary, elaborate precautions being followed as to removing a minimum of insulation. After a prescribed routine of layers of insulation, winding was begun.

There were upwards of 20,000 turns of wire which were not put on entirely mechanically; the machine wound them at its own speed, but the operator had to stop it at set intervals (about every 2,000 turns) to insert silk insulation; towards the end of the run further precautionary work had to be done, such as varnishing. If the wire broke, it had to be joined and elaborately insulated.

Primary winding was a little easier in the type of wire dealt with, but there was more actual manual work—soldering of wires and so on. The two tasks

were considered as aspects of the same job, since they were essentially similar. Both took a considerable period—up to 3 months—to learn in the sense of becoming proficient, and this was recognised in that piece rates were graded more easily for beginners. The cycle of operations took similar times—about 3 minutes for primary, 5 minutes for secondary.

The layout was similar for each type of winding; a bench some 3 feet wide by 2 feet deep, with the winding machine rather to the left of centre. There was a tensioning device and racks for wire, which effectively cut off one's view to the front, though it did not make a totally blank wall. To each operator's left was a table with supplies of insulating silk and paper; she was able to fill in some winding time cutting this in readiness for requirements. Benches were side by side in pairs, with pairs arranged behind each other. Operators could talk fairly freely with their neighbours at the side, and could make occasional remarks to the girls in front or behind. Trips about once an hour—or oftener—for supplies allowed further contact with others.

There was no change or rotation of task, and no chance to vary the routine, which was closely prescribed for technical reasons. There was some variety, but not much; a particular type of armature would continue at least for days, and frequently for weeks.

Dial Printing. Job 2

This was a relatively simple job; the main part consisted in printing dials about 2 inches in diameter with ammeter or switch markings; these were picked up in paint from an engraved plate to a gelatine pad and transferred to the dial. The machine was purely hand operated, being a simple lever-operated plunger to carry the gelatine pad up or down and a jig to position the dials.

A day's material was supplied at a time and the operator counted it as required to trays of 100, tipping these to a bin for removal at the end of the day. Some cleaning was part of the job; cleaning the machine of accumulated paint, and cleaning the bench at the end of the day. There was no change of task, no rotation, and the operator could not vary the routine, which took about 12 seconds for a cycle. She sat in a rather isolated position and could only talk to people passing by.

FACTORY NO. 4: LIGHT ELECTRICAL ENGINEERING

This was a large modern factory in an area largely devoted to light engineering industry; out of 1,000 production employees, 300 were women. The jobs studied were mainly among these 300 since they were the repetitive tasks; many of the men's jobs were more in the nature of attention to machines. Some men on presswork were studied, but since they were the only men in the programme of job studies and interviews, the results have not been included with the general results; they were not comparable with the rest, and were too few (six of them) for purposes of comparison.

The factory enjoyed a reputation locally for hard work and high pay; in an area where labour was scarce, it was not difficult to maintain a working force. Basic rates of pay were at least up to the local average, there was a production bonus paid either individually or to groups on output, and a monthly bonus paid on overall factory efficiency. There was also a merit rating scheme which put up pay by a possible 20% maximum; in fact, a considerable proportion of the workers received 5%, 10% or 15%.

Every effort was made to provide good working conditions, and these appeared to be appreciated. Supervision was easy so long as the prime object—the production of the scheduled amount of up-to-standard material—was achieved. Labour turnover was extremely low, being less than 15%; how far this was a result, and how far a contributory cause, of the generally harmonious relations it is difficult to say.

Armature Winding. Job 3

As in the other winding job, a machine was used which ran at a fixed speed but was started and stopped at the discretion of the operator, and there was a good deal of manual work in the cycle; in fact less than half the total time was machine winding. The winding was not done in one straight run, but consisted of 20 separate sets at intervals round the armature; each one required a separate start and finish, with sleeving at its two ends. The machine, once started, wound the correct number of turns and then stopped. The total cycle of operations took some 7 minutes.

Each of the 20 operators had her own bench and machine and sat at the job. Benches were arranged one behind another each side of a conveyor down which the finished armatures were passed for the next operation. Talking was difficult, though occasional remarks could easily be exchanged; and since the operators had to fetch supplies about every two hours, this gave an opportunity to talk to others. (Officially they were supplied with material, but in fact they usually fetched their own.) Payment was by bonus on individual output.

The winding task was reckoned to take three months to learn to full proficiency on one or two types of armature. Several types were wound, but as far as possible each operator was kept to one or two types. The operations were similar on all, but different gauge wire and colour codes were used; these could confuse an operator if changes were frequent. There was no way of varying the method of working, since the order of operations was fixed by the intrinsic nature of the material and task.

Armature Connecting. Job 4

The wound armatures were passed down a conveyor to the connectors, whose main task was to take the wire ends in the correct order and fit them into the appropriate slots in the commutator. The armature was held in a jig during this operation, and during the subsequent tidying up and binding down of the ends. The connectors did not solder the wires in to the commutator strips, but left everything ready for this to be done. The total cycle of operations took 2 to 3 minutes.

The layout was similar to that of winding; a conveyor with a line of benches behind each other down each side. Supplies were received, and finished armatures were removed, largely by the conveyor, but there was no pacing from it. Bonus was on individual

output. There was some variety in that any girl might handle either of two types of armature coming down the conveyor in trays of 20. There was no real change of task, but owing to hold-ups of material it sometimes happened that there was not enough work to keep all the operators fully occupied. There was no real chance to vary method of doing the task.

Training took about 6 weeks to proficiency, and during this period quite a number of trainees left. The task of connecting did not really demand much intelligence, but because it was one in which mistakes could be costly the firm tended to select for it people capable of a more demanding task.

Bag Sewing. Job 5

This job was similar to most sewing machine jobs except in being on heavier material than is usual. Three types of machine were in use, flat bed, 'ringer', and Union Special: the number of operators was 5, 17 and 4 respectively. Occasionally there was some exchange of machines, an operator from one unofficially taking over a spare for half an hour to ease a bottleneck; this was usually her own type of machine on another size of bag, but one or two operators could take over different types of machine. There was a group bonus scheme in operation, and it paid the girls to watch the total output as well as their own particular contribution.

The work cycle time varied from one task to another between half a minute and three minutes; this was for the actual assembly and sewing. Included in the job were the ancillary tasks of threading, cleaning the machine and shifting material to the next operator. There were enough different sizes to give some variety, and the unofficial rotation was such as to include possibilities of varying the order of doing parts of the cycle; in fact the operators had a good deal of freedom subject to turning out a satisfactory total of good work.

The machine did not pace the operator except in setting a limit to speed which was high enough not to be annoying; the real limit was the skill of the person. It was reckoned that three months was needed to train a girl, and the job demanded a certain intelligence to keep track of different types and occasional difficulties with materials or machines. There was a limited chance to talk, and the organisation as a team made for a good social grouping. Work was done sitting, but occasional moving around was necessitated in order to shift material.

Assembly. Jobs 6 to 11 inclusive.

A number of assembly jobs are included under the same general heading because they have features in common. It was a general policy to organise this type of work in teams paid on a group bonus scheme so as to avoid complications in balancing work load; unofficial rotation of tasks was allowed to even out inequalities in work flow. For this reason the classification in the text cannot be too rigidly interpreted as to rotation, variety and variation in method; there was some rotation in nearly all cases, and those jobs marked '—' are those where rotation was very rare. The jobs are described below.

Job 6. Coil taping. The main task here was the covering of field coils—coils of moderately thick wire in a rectangular form about 4 inches by 3 inches. A taping machine was used, capable by a shuttle action of going through the gap in the centre of the coil and thus binding together the wires. Each coil, since it

had two lead-in wires to be left free, had to be taped in two stages; the last turn was looped in by hand under the one before and pulled tight. The total task took some 20 seconds, and there was little or no chance to introduce variation in method. There was a slight variety introduced by different sizes of coil.

Job 7. Bottom plate gasket assembly. Of the assembly jobs, this was the only one studied in which there was change of task. The production was not always sufficient to keep two operators busy, and one was sometimes transferred for half a day to other assembly jobs. The work was to fix on felt and rubber gaskets to a die-casting; it was a rather messy business, involving glue and rubber cement. Cemented parts were put in a press to set. The order of doing sub-tasks could be varied a little, but there was no variety in the material, which was all of one size and pattern. Cycle time was about one minute.

Job 8. End caps. There were two parts here, a rivetting done on a machine standing up, and the cementing in of a rubber gasket which could be done sitting down. Material was received on racks holding 98 parts, and one was more or less tied down to doing the first operation on the full number, then the second. There was practically no change or rotation of task, and no variety in material. The cycle time was about 50 seconds.

Job 9. Friction taping. This was a purely manual operation, taking the field coils mentioned in Job 6 and binding certain points with insulating tape. The coil ends had been soldered on to flex, and the join was insulated with tape and pieces of flat stiff material. The task was done seated and took about 40 seconds; sub-tasks consisted of preparing insulating tape in 4-inch and 1½-inch strips. There was as much variety as in Job 6, but no means of varying method; there was no rotation or change of task.

Job 10. Cord assembly. The flexible lead arrived at this operation with the plug body loosely threaded on and the wire ends bared and fitted with a terminal ring. The assembly operator pushed on a sleeve and tied two strands of cotton insulation to anchor it, then slid up the plug body. She placed the wires and an insulating sheet in position, using a jig, and screwed in the pins of the plug, which themselves formed the terminal screws; the screwing was done with a power screwdriver. On certain types of lead, the power screwdriver could not be used, and there were other minor differences; in fact there was variety and variation in method. On the other hand, the operative was kept pretty closely to the one task, having neither rotation nor change. The cycle occupied some 50 seconds.

Job 11. Motor casing. This job occupied two people, each normally on a different stage. The first stage involved rivetting various pieces on to a main casing of bakelite about 12 inches by 8 inches by 4 inches in size. Three separate rivetting machines were used for different parts, and two jigs; the task had to be done standing up, since the rivetter was of the pillar type. Two hands were used to hold the work and one foot to operate the punch. The second stage involved screwing on various switch parts with an air-operated tool; for part of the time the casing was held on a jig. Both the first and second stages took some 20 seconds and each was further sub-divided; the first between rivetters, the second between work done on the jig or off it. Thus each stage had some possible variation in the number of piece parts dealt with in one operation

before going on to the next. There was also rotation since the two operators would help each other to keep the balance of production; but there was no change of task or variety in the material.

The learning time and intelligence demands of these tasks were such as to put them in a fairly low category. Coil taping (Job 6) took longest to learn; the knack here was to get the coil neatly taped by a machine which, while it was running, had a fixed and rather fast speed although its stop and start was under the operator's control. In general the jobs needed a little more intelligence than the mere performance of the tasks would indicate, because of the group bonus system. Not only did operators expect to know enough of other people's jobs to help out at times; they also expected to be left to organise this helping out in a manner that would produce an even flow. Each line had a 'leader' who acted as a focus for these arrangements rather than as a supervisor.

Carton Stitching. Job 12

The cardboard containers for packing the finished products were fairly elaborate, having spacers and fittings for protection. The operators assembled these from board already cut and scored for folding; they stitched them with the usual type of wire-ribbon stitcher. The total cycle time was four or five seconds for a person; this might be for a sub-assembly of cardboard pieces or for putting a sub-assembly into the finished case. These differences provided variety rather than task rotation; making sub-assemblies was sufficiently like making the final carton to be regarded as a variant of the same task.

The task took some time to learn. A newcomer could put in the stitches one at time, but only a practised operator could keep her foot on the pedal and run in the required half-dozen at machine speed. Up to four operators worked as a team and were paid as such; they shared out stages of the work to ensure a good flow. Pacing was merely to keep up with the team; the stitching machine, despite its fixed pace of actual stitching, was controlled by the operator. Operators stood up to work, and could move around to get material, which by reason of its bulk was stored over a fair area. There was neither rotation nor change of task; and variation in method only in so far as it accompanied variety, *i.e.*, different types of carton.

FACTORY NO. 5: PHARMACEUTICAL

This was a modern factory employing about 500 people, of whom over half were women; of the production employees as distinct from maintenance staff and the like, at least three-quarters were women. It was similarly situated to Factory No. 4, in an area where light industry had grown to an extent which rather outstripped the available labour. Nearly half the women employees were part-timers, working mornings or afternoons.

The main activity was packing either drugs and fine chemicals or certain patent foods. The former were packed as powders, tablets, capsules or liquids in bottles, vials, ampoules or boxes; the latter were packed mainly in tins. Most of the work was involved in packing; such making up as went on in the factory involved rather few people, and much of it was done at one or other branch works. A high standard of care and cleanliness was maintained, and in some departments this even meant providing 'sterile rooms' with air conditioning and special precautions on entry.

All work was done on straight time rates of pay, modified by merit rates and a profit sharing scheme.

The merit rating in fact often amounted to an extra payment to key operators on whom speed of a line depended; the profit sharing applied to all employees of over six months' service. It was distributed monthly, and rose at the time of the studies to as much as 33% of operators' pay.

Food Packing. Job 13

The basic job here was to fill tins or cartons with powder. The powder was dropped in weighed quantities from a chute, and one operator (the 'catcher') collected it in a paper bag as it dropped. The powder dropped once in 3-4 seconds; she had to open out bags from the flat as well as to fill. If she got behind she could switch off the filler for a short time, but could not alter its rate except by permission of the forewoman. Spilt powder went down a grid to a hopper. The 'catcher' was the key operator, and received 'semi-skilled' allowance in the merit rating scheme.

Filling was a team job, and other team members worked as follows. No. 2 folded in the bag top, and on some lines sealed it on a heat sealing machine, in which case she might have a second girl with her; No. 3 put the bag in its tin; No. 4 put in a measuring scoop and one or more leaflets; No. 5 put on the lid. No. 2 or 3 also check weighed a bag (about every sixth was the aim) at intervals and reported to No. 1, the 'catcher', if it was outside tolerance limits. No. 6 operator watched the operation of a machine which wound cellophane tape to fix the tin lid, and No. 7 packed the finished tins into cartons which then went away on a roller conveyor to be banded. This was the basic routine, which varied a little for different products, different sizes of tin, and for export packs.

There was variety owing to these changes of pack, but little change of task. There was rotation; the 'catcher' changed hourly with operator 2 (and on some lines, operator 3); the remaining operators took all tasks in turn at hourly intervals. Only a few were reckoned suitable as 'catchers', and for this reason the scope of rotation for the regular 'catcher' was limited, since only a limited number of others could relieve her. Learning took some weeks to acquire a good speed, especially on 'catching', but not much intelligence was required. The 'catcher' was rigidly paced, whereas the rest of the team could vary their speed a little by storing up partly finished material. There was hardly any noticeable chance to vary the method of doing the job, though one operator remarked that there were two or three different ways to turn in the top of the bag; in so highly repetitive a cycle, the smallest difference looms large.

Most of the tasks were done sitting; the exceptions were the packing and cellophaning of tins, and one task not so far mentioned. This was done by an operator shared between two teams; she removed empty tins from their packing and unlidded them. This operator took part in the rotation with the main bulk of the operators on one or other of the lines she supplied.

Pharmaceutical Packing. Job 14

The packing room handled an enormous variety of lines, broadly classifiable as liquids, pills, capsules or powders, and packed into bottles, tubes and cartons. The individual containers were packed into larger cases for despatch. Few lines ran longer than two days on one particular item, and it was common to

run only half a day. The work was done on a team basis, and the change to a different item of production meant more than just variety in material; it involved a reorganisation of the team, and sometimes even splitting it up. One may say that all work in this job was subject to change of task in the defined sense, as well as to variety of material.

The usual layout was a team of six to twelve girls seated each side of a bench which had a conveyor belt down its centre; the belt was for transport only, and there was room on the static part of the bench for storage of a small working stock of material. The operation at the head of the belt, as in Job 13, set the pace, though not rigidly; even if it were a hand job, such as measuring pills into a tube, the operator on it was chosen for a good rate of working and was paid the 'semi-skilled' rate. Sometimes this first task was done by a machine, and its operator's job was rather different from the rest; machine operation is considered separately under Job 19.

The packing tasks proper were simple and, despite the variety of lines, consisted of a few basic activities: wiping bottles, fitting caps or lids, putting bottles or small cartons in larger boxes, labelling, corking, wrapping in cellophane and so on. They did not demand much intelligence, though conscientiousness was important in those sections of the task where an item of inspection came in—inspection to confirm that the correct label had been used, for example. There was, of course, an overall inspection separate from the line, but the internal check was useful in showing up faults immediately if they occurred. The packing tasks were easy to learn at slow speed, but to do them fast needed some practice; the frequent change of task made this practice a little hard to obtain.

Most of the team packing tasks were carried out sitting, but some could be done better standing; as there was rotation of tasks within a team at hourly intervals, most operators sat and stood alternately. Apart from the supply of material from the initial task, pacing was largely a matter of keeping up with the team; with a good team, slower members were helped by faster ones. The task did not allow much chance to vary methods, but operators were allowed to take advantage of what opportunities arose; the management did not attempt to enforce the use of any 'one best method'. The cycle of operations was within the range of 10 seconds to 30 seconds.

Adana Printing. Job 15

The labels and cartons used for pharmaceutical products were printed by the makers, but often required an overprint giving batch number, date of packing or special instructions. This printing was done on Adana machines. The label was put in place accurately, the lever pulled, and the printed label removed; a short, highly repetitive cycle of five seconds or so. The type was set by another operator, but the printer had to arrange a simple jig of pins on the platen to keep the label in register each time, and had responsibilities in printing the correct quantity of each item. This involved liaison with the forewoman and the typesetter at the beginning and end of each batch; the demands on intelligence and care lay here rather than in the routine operation. The task took only a week or so to attain speed.

On this individual work there was no rotation, and no change of task; nor was there any means of varying the method. But there was a great variety of material, special instructions in foreign languages, and

so on; the regular instructions from the forewoman and the importance of getting them right gave the operator the feeling that her work mattered. The printing task was done seated, but trips for fresh material and instructions made a break, and the effect of batching was felt by operators.

Ampoule Washing. Job 16

Ampoules after filling were washed and polished on the outside. They were fetched in boxes of 100 or trays of 353 and put into a warm water bath containing detergent. The operator then put them on a cloth stretched over a sink for preliminary draining, after which she moved them to a towel on the bench in front of her. The first drying was done by rolling them gently on this, using one free end of the towel to roll them. A final polish was given to each ampoule and it was put into a tray and taken a short distance to the inspector. The individual wiping took two or three seconds per ampoule; the rest of the cycle two or three minutes for the batch. The length of time in the bath did not affect working rate once the first batch had soaked.

The task made little demand on intelligence, and could be quickly learned. There were ancillary tasks—refilling the bath at intervals, removing any cracked or empty ampoules. There was no pacing and little chance to vary the method, unless by withdrawing more or less ampoules from the bath at one time. There was an occasional change of task—or, more strictly, enlargement of task—when the same operator inspected ampoules as well as washed them. The task was mainly done seated, with periods of standing to attend to the bath or fetch supplies.

Ampoule Inspection. Job 17

Ampoules received (or occasionally collected) from the polishers were inspected for obvious faults and for specks in the contents. The inspector ran her hand over the tops to check good sealing, then started the visual inspection. The bench had a white enamelled top with a black rubber strip laid on part of it. At the back were two fluorescent tubes behind a translucent screen some 15 inches above bench height. As an inspection background the operators usually used the black rubber; sometimes they laid white paper on it, and certain faults were checked by holding up the ampoule to the direct light. Choice of background was left to individual preference, and varied with the colour of the ampoule (clear or amber) and the contents.

The inspectors worked in the same room as the washers; sometimes the same person would do both tasks, and it may be argued that washing, polishing and inspecting formed one job. There was a tendency to keep to one or the other, and they are treated as separate jobs in this description. One must also regard them as a team job; inspectors and washers worked in close proximity and formed a social working group.

Inspection did not demand much intelligence, but was apparently a task that not everyone could do effectively. Evidence from other sources suggests that visual inspection such as this for small specks is much more subjective than one might suspect. Even if specks did exist in some of the ampoules passed, they were unlikely to have been noticed by the person using the drug, or to have harmed the recipient; in a similar case at another pharmaceutical works, check inspections showed a remarkable variation of rejection rate dependent on apparently chance factors.

The occasional enlargement of task to include washing has been mentioned; apart from this there was little change or rotation. There was variety in size of ampoule and colour of glass or contents, but not much opportunity to vary method. The main task was done seated, with some chance to get up for supplies.

Vial Polishing and Inspection.

These were regarded as variants of the similar jobs done on ampoules. The vials were rather larger than ampoules, did not follow the same washing process, and their inspection included the use of a mirror to inspect bottoms. But the general plan of the job was sufficiently similar for it to be regarded as part of the same job for classification and description.

Ampoule Printing. Job 18

Ampoules had their label printed direct to the glass in a machine. The operator took a tray of 353 ampoules, sat down at the machine, and filled up the feed slide, guiding the bottom ampoules in to the machine feed. Then she started up the machine, adjusting its speed if necessary, and continued to feed in fresh ampoules and to remove printed ones. The feeding rate was about 60 per minute, and the preliminary work took 15 to 20 seconds. The task was machine paced in a sense, but the operator controlled the machine speed and could start and stop it quite freely.

The operator did not have much responsibility for the machine, but left adjustments to the chargehand or mechanic. On this basis, the task did not demand much intelligence, nor did it take long to learn. Operators were somewhat isolated from others in the room, and did not have much change of task or rotation. There was some variety since two sizes and several colours were handled, but no opportunity to vary the method.

Machine Operating. Job 19

Machine operation, in the sense implied here, is not really a repetitive task; but since a few operators on this type of work were interviewed, a description is given. In some pharmaceutical packing operations (Job 14) the machine operator was part of a team where the remaining people were on repetitive work. The job described is that of operating a machine which replaced a food packing line (Job 13) by one machine operator and two packers.

The machine automatically made up small cartons from the flat, sealed one end, filled in a weighed quantity of powder, sealed the other end, and delivered the finished cartons to packers who fitted them into cardboard cases for despatch. The machine operator had only one repetitive task in her job, that of feeding in carton flats, and it occupied a relatively small part of her time. The main task was to attend to the machine, noting the quality of sealing, accuracy of weight, and other points. A deviation from standard on any of these matters required an adjustment—or several adjustments—on the machine; to decide which adjustment and how much of it was a matter of experience and intelligence. On the food packing machine it required a fairly high order of intelligence, since the machine was new and the operator had to make her own rules of action from observation with hardly any aid from supervisors or others.

The machine operators on pharmaceutical packing (connected with the teams on Job 14) were not so highly skilled in the sense described above, but their

work nevertheless had an element of machine attention. Compared with the job of the previous paragraph, they had more repetitive feeding and less machine attention, but on account of the latter the job has been classified as machine operation.

Pool Operators. Job 20

A certain number of operators had no set routine, but were allocated each day to whatever task required them. Mainly they were newcomers, and being a pool operator was regarded as a means of familiarising them with the work. Moreover, this constant change was not popular with the operatives themselves, and it was thought fairer that newcomers should have it than people of relatively long service. The disadvantage from the firm's point of view was that many promising operators left after a few weeks of this; for this reason arrangements were in hand to provide a more organised training period and to reduce or eliminate dependence on pool operators.

Meanwhile, at the time of the job studies and interviews, there was a considerable number of pool workers, and some features of their job merit consideration. They were of necessity used mainly on simple tasks, but one cannot say how long it took to become efficient; some might continue to be at the learning stage for weeks through being changed from task to task so frequently, while others as a matter of chance had less change and became proficient at a few tasks. Often they were put on team work to fill in the place of absentees, but they did not usually stay long enough to become well integrated with others in the team. The one characteristic common to all pool jobs was frequent change of task.

FACTORY NO. 6: CANISTER MAKING

In this factory were made 'composite canisters'—the type of 'tin' which has a metal top and bottom but a cardboard body. The factory, one branch of a firm with several, was in a North Country industrial town and employed about 500 people in all; of these, 370 were women working on the production processes. Many of them worked part-time, either 7.30 till 12 or 1 till 5.30. Most of the workpeople lived fairly near.

There was no direct incentive of the piece rate or production bonus type; though the scheme of merit pay was supposed to take account, among other things, of consistently fast work. In fact, since most of the jobs were done by teams, individual variations in output were levelled out, and the merit pay was thought by most operators to be allocated rather capriciously. The general pace of work was not high, because teams were nearly always overstuffed to the extent that one operator could be missing without causing difficulty to the others.

Pasting Labels. Job 21

The cardboard tube for canisters was made in lengths of about 4 feet, and these were covered with a single sheet of label duly printed to be cut up into finished lengths with the tube later. As used, these labels were thus about 4 feet by 1 foot. A team of two girls first pasted them at a bench with an electrically driven pasting roller. One girl took roughly a third of the packet of 500 labels, rolled it to separate the edges, and fed the labels one at a time through the paste roller. The other took each one as it emerged, picking it up by the middle to let it fall doubled up, paste inside. Having piled up 8 labels, she removed them a couple of yards to the table con-

cerned with the next operation, labelling. Subsidiary tasks were topping up the paste in the roller trough, wiping down the bench fairly frequently, and opening up new packets of labels.

The job did not make much demand on intelligence, and could be learned in a day or two to an acceptable speed. Very young girls, newcomers to the factory, were usually put on this. The two operators changed tasks each hour, providing rotation; but they did not change to a different task. There was no real way of diversifying the method, but materials introduced variety in size, colour and design. The girl putting in labels sat, the other stood and moved a yard or two to the labelling bench every minute or so; eight labels took rather under a minute to paste.

Labelling. Job 22

Four operators worked as a group, putting on the pasted labels, smoothing them, and laying the labelled tubes on a rack to dry. Pasted labels were provided in a pile on the centre of the bench, and the tube winder delivered lengths of tube nearby; an operator sat on each side of the bench applying labels to the tubes and passing them along to the other two operators. The latter smoothed the labels, wiping them with a damp cloth, removing any air bubbles or lumps of paste from beneath the labels, and generally tidying up the product. One of these two also removed labelled tubes to storage on racks to dry, at a distance of two to five yards from the bench.

The operators rotated tasks, usually every hour, but they did not change to another task under ordinary circumstances. There was little chance to vary the routine, but the different sorts of labels provided some variety. Labelling and wiping was done sitting, but the removal of tubes obviously involved some standing and movement. The job made small demands on intelligence, and could be learned in a day or two. Each labeller handled some hundred labels an hour, and the smoothing and carry-off operators thus dealt with two hundred.

Track Jobs. Job 23

Labelled tubes, after drying, were supplied to a cutter who slipped each over a mandrel, locked the free end, and pressed a pedal which rotated it against cutting wheels set to divide it into appropriate lengths. She released the pedal, allowed the tube to come to rest, freed the mandrel end, and slid off the cut tubes to a table fitted with a raised edge to prevent spillage of tubes.

A feeder scooped up the tubes and set them upright in the 'track'—a narrow channel with a belt or chain conveyor leading into the machine. Sometimes this conveyor had a friction feed, sometimes a positive feed which meant fitting each tube in a space at strict intervals; but in the latter case, no harm was done if the operator missed a space now and then. The tubes passed two operators who put on the tops (or bottoms) of the canisters—a paced task, this—and went into the seaming machine which rolled the tin-plate tightly to the cardboard. One operator was in charge of it; the job was not machine operating in the sense referred to in Job 19, the major responsibility being to stop and clear jams when they happened, rather than to avoid them by intelligent anticipation. On some machines the operator also cleared the seamed canisters to a chute or table. Further work depended on the type of canister; some were put into cases, some wrapped in bundles in paper, or tied in

bare bundles. Usually four people were involved in the wrapping or packing on one line.

This was the layout of the typical line; some had extra tasks, for example, 'doping' the cardboard on one line to ensure a watertight joint. Demands on the operator's intelligence were slight, and the tasks could be learned fairly quickly. There was a certain knack in some; bundling and tying the canisters, and in handling tubes quickly on and off the cutting mandrel. Most of the tasks were paced by the general speed of the team, the exceptions being that of putting on bottoms or tops, and removing canisters from the seamer when this was not automatic. There was rotation of tasks, not among the whole team but in two parts; from cutting to seaming, the girls would rotate with each other, and similarly so would the rest; but there was no interchange between the two halves.

There was some change of task, since change of material often meant a reorganisation of parts of the line from, say, wrapping and bundling to packing in cases. Variety of material there was in plenty, but the method was usually rigidly fixed. The rate of running was of the order of 60 canisters per minute; the cutters got from 3 to 6 canisters from a tube. On 3 per tube, it was usual to allow two cutters to a team. All the tasks were performed standing except for some of the ancillary ones, such as 'doping'; but owing to the liberal staffing of the teams, anyone really needing a rest could in fact, even if not officially, take it.

Miscellaneous Composite Work. Job 24

These resembled the Pool (Job 20—Factory 5) in that no one person was on one job for more than a day. Here, however, there were no people whose sole job was to carry out miscellaneous work; it was done by people temporarily displaced from some of the regular jobs described above, and to this extent formed a task rather than a job in the sense understood in this report. The usual supply of labour was from operators arriving late at work; their place on the regular line would be filled in order to start the line, and they themselves would be relegated to odd tasks. Most of these were disliked, so there was an incentive to be early; but one may remark that a few operators enjoyed some of the miscellaneous work, and that in their case it was a reward rather than a penalty for lateness.

All the tasks were performed sitting down, none of them needed much intelligence, and any of them could be done with the minimum of instruction and learning. They were:

- Sorting out badly made canisters and salvaging tinplate ends;
- Fitting parchment discs to lid rings;
- Fitting a quick release string device to certain types of all-cardboard canister;
- and others.

Plate Oilers. Job 25

The tops and bottoms of canisters were pressed out from tinplate of various grades and thicknesses; before pressing this needed to be oiled, to allow for some slip in forming to the shape of the dies. Oilers worked in pairs at a bench, each working independently. The oiler would go three yards or so to the truck of plates, take a few hundred (the actual amount depending on weight) and bring them to the bench. She would oil her rag from the can provided, wipe it over the top plate with the right hand, seizing the plate meanwhile with the left ready to slide it to a

second pile. When a sufficient number had been done, she took them to the press, in most cases a couple of yards behind, occasionally further away.

There were various types of plate, some being scrap from other factories of the firm which was unsuitable for its intended purpose of making metal cans; this was often printed on one side. Such metal, unlike new plate, had to be kept one way up. Plate for food containers required special oil; points such as this, besides giving variety, made some small mental demand on the operator. There was a certain knack in doing the task quickly without cutting oneself on the edges; a speed of 140 sheets a minute was acceptable, the sheets being about a square foot in area, but rectangular rather than square.

The oiling was done standing, and there was opportunity to move around for more plate, or to take it to the presses every five minutes or so. The two oilers at a bench could talk to each other and at intervals to the press operators and the man who supplied trucks of plate. There was little chance to vary the routine, hardly any change of task, and officially no rotation. But for a few minutes two or three times a day oilers would change places with a press operator if on sufficiently good terms.

Power Presses. Job 26

Much of the straightforward work of making canister ends was done on power presses. These were of the usual type in which a top and bottom die were mechanically forced together when a pedal was pressed; the tinplate sheet was fed in a more or less horizontal plane and the top die moved at right angles to it. One quick pressure of the pedal, immediately released, gave one stroke; keeping one's foot on gave a succession of strokes at a speed depending on the gearing and power. With good plate, this could be done by an experienced worker, and was referred to as 'repeating'.

A typical plate 18 inches by 6 inches, different on each side, provided a dozen lids. The operator took one sheet right way up, and pushed the back long edge under the die. (Suitable guards were fitted to prevent hands getting in.) She then pressed the pedal and kept it down; holding the part of the sheet projecting outside the guard, she moved the plate along between strokes, positioning it so as to obtain the maximum number of lids from the plate available. Skill lay in doing this at 'repeating' speed, neither spacing the lids so wide as to get too few nor so crowding them as to overlap and be useless. At the end of one row of six lids, the operator released the pedal, turned the plate, and ran another row from the other side. The scrap was thrown to a bin; the lids were automatically ejected to a box, and the operator inspected them from time to time for quality, and replaced the full box by an empty as needed. The stack of full boxes was removed by a labourer.

The presses could be worked standing or sitting, but were often set at such an angle that sitting was difficult. One could not talk while operating owing to the noise—and the need to attend to positioning the plate. Occasional talk with the plate oiler or adjacent press operators was possible. Some skill was needed, but demands on intelligence were small. There was little or no change of task, and only the unofficial rotation referred to under the description of plate oiling. There was variety from time to time due to a change of size; this was kept to a minimum to reduce die-changing, and may not have amounted to much from the operator's point of view. The rate of work-

ing was 40-50 strokes per minute when 'repeating'; this was a paced task, but only over short periods and at the operator's discretion. It was accepted that a good operator would 'repeat', but little pressure was put on those who were reluctant to do so, since it might lead to a heavy scrap rate.

Hand Presses. Job 27

The common type of hand-operated screw press was used for some work such as punching holes in lids, riveting on small fittings to special canisters, etc. The material was put under the die and the press handle thrown round; after stamping it was pulled back and the finished part removed and thrown to a box. Several of these presses were badly arranged in that the press tended to fall by gravity and had to be held up with one hand. An adjustment to the press to increase its friction, or a spring catch, was suggested as an improvement, but during the study this had not been fitted, and the operators' views were given on the task as it stood.

The hand press operators were seated along a bench; although working individually, they formed a social group and could talk since the presses were fairly quiet. It was possible to do the task standing, but as the bench was designed for seats of normal height this was not convenient. There was a considerable variety of work but hardly any chance to vary method; there was little if any change of task and no rotation. The task was not paced except insofar as one could get up a rhythm on the press; such a rhythm was partially controlled by the weight and setting of the press. The normal working speed was around 400 pieces per hour—a work cycle of 9 or 10 seconds.

FACTORY NO. 7: FOOD PRODUCTS

As at Factory No. 5, the studies here were of the packing of a product and no consideration was given to its preparation in bulk, which was not repetitive work in the sense understood. The factory had been established some 40 years in an area which has more recently been 'invaded' by light industry; the demand for workers, once quite inadequate to take up all those available, was at the time of the study in excess of supply. The firm was regarded as a good place to work, and experienced little difficulty in finding operators; a tradition of good industrial relations, albeit on a paternalistic basis, helped in this respect.

There was a family background; but the head of the firm was at the time of the studies rarely seen, and to newcomers was known only by name, whereas with the old employees he was on friendly terms. To many of the packing operatives whom we interviewed he was a shadowy figure in the background, but, even so, was understood as a symbol of management more than were most of the actual managers, whose main preoccupation was on the technical side of the manufacturing process. To the packers there seemed a void between the foreman of their department and the rather exalted figure of the 'old man'.

The factory employed just over 1,000 people all told, of whom some 200 were women working on the various packing jobs; another 200 were office workers, some of whom are mentioned under 'Factory No. 8' which in fact was the office of this firm, parts of which carried out very repetitive operations. Of the 200 packers, 50 were part-time workers. None was paid on any production bonus or piece rate system, but there was a graded rate of pay; those who could

do several tasks efficiently were paid a few shillings a week extra.

Tablet Machine. Job 28

One product was tablets compressed from powder; these were about half an inch square by a quarter thick, and were wrapped in waxed paper by machine. The machine was fed by hand, the tablets being swept into compartments on a belt moving into the machine; they were swept across a metal plate with holes to sift off loose powder. The tablets were nearly square but not quite, and had to be put in the belt right way up; operators also had to watch out for soft ones, recognisable by colour, lack of shine, or poor shape; these would jam the machine, and were swept to a box for re-processing.

One operator fed the machine, while another took the wrapped tablets and arranged them on trays in nines. This second operator stacked the trays for collection, but occasionally had to take them to the next bench, leaving the wrapped tablets to collect in a box at the end of the delivery channel meanwhile. Each tablet had to be turned 90 degrees as it was collected, since it came out of the machine flat and was required on edge by the packers. To acquire the skill of doing this at machine speed took about a week, but an operator who had done so could cope with the machine and deal with spares that had fallen in the overflow as well. The knack of feeding the machine was a little easier to acquire.

The two tasks described were rotated between the two operators at hourly intervals, but there was little chance of changing to another task. There was no variety in the material except insofar as occasional batches were soft and gave trouble with the machine; but this is not variety as defined. The only way to vary the method was to let some wrapped tablets fall to the overflow and practise recovering them while dealing with the regular flow; operators sometimes did this. The tasks were both strictly machine paced, at a rate of about 80 tablets a minute. The feeding operator wore cotton gloves to avoid soiling the tablets. Both operators joined in cleaning the machine before the lunch break and at the end of the afternoon; on Fridays there was an extra amount of cleaning to be done.

Each week the teams moved round to a machine of the same type in a different part of the room; this custom originated in order to even out the time spent on machines considered to be in a draughty place. There were slight differences in speed and design of feeding belt such as were readily noticed by the operators, though they would escape any but a thorough observer from outside the job.

Tin Bench. Job 29

The wrapped individual tablets were bundled in nines by a machine which applied a second wrapping of waxed paper. This delivered the bundles, some two inches by roughly half an inch square, at the rate of 70 per minute, to a bench where three operators worked. The procedure was to lay out six tins along the bench edge, seize two bundles in each hand, and fit two bundles per tin. The tins held twenty tablets; an extra two singles were put in to make up. Some tins were supplied with lids separate; others needed to be opened up.

The filled tins were fed by a fourth operator to a machine which taped the edges to fasten the lid. She fed in six to eight tins at a time to a magazine, taking care to put them in right way up. They had to be put

in at the right point of the machine cycle (some 2 seconds) so as not to foul the pusher at the bottom of the magazine. This operator also put in fresh tape every quarter of an hour, and stopped the machine if it ran short of tins. A fifth girl packed the tins to cardboard containers, holding 36 each, and a sixth looked after supplies of tins and other material.

The whole six formed a team, organised in pairs. The first pair filled tins, one putting in the bundles of 9, the other putting in the two single tablets and fitting the lid. These two could not quite manage the full output, and the third girl packed the rest, bundles, singles and lids. This third girl paired off with the supply girl, leaving the taping machine operator and the packer as the third pair. The three pairs rotated tasks every hour, each pair moving to the task previously done by another pair. There was a second half-hourly rotation within two pairs, the third packer changing with the supply girl and the packer with the taper. The two main tin-filers did not rotate half-hourly with each other.

These tasks made little demands on intelligence, but took a week or two to learn to full speed. There was no variety of product, and little chance to vary methods; but it was a social job with adequate rotation, even if no change of task. All tasks except that of the supply girl were machine paced; it may be remarked that the final packing operation was paced too slowly for most people.

Bundler. Job 30

The output of Job 28 was wrapped tablets in groups of nine on a tray; these nines were wrapped together on the bundling machine ready for the tin bench (Job 29). Two operators collected trays, fed the machine and looked after it; the delivery end of the machine was on to the tin bench and did not concern the bundlers.

The main task was to feed wrapped tablets in the ready-arranged nines between spacers on a belt running in a groove; it ran intermittently, allowing a momentary pause to fill in tablets. The operators sat side by side with the belt running across in front of them; the one more remote from the machine filled every other space, leaving the rest to her partner. The machine handled 70 bundles per minute, and the supply trays held 90 bundles; thus one operator had to leave off feeding for a few seconds every minute or minute and a quarter to arrange a fresh tray.

It was part of the operators' job to see to minor jams on the wrapping machine such as were caused by paper feeding in double, and to keep it supplied with paper. It was not expected that the operator would need to attend to the machine in the true sense of a machine operator, as discussed in Job 19; this job was primarily machine feeding with ancillary attention. It did not need much thought, though the knack of doing the task at full speed took a week or two to learn. There was no variety and no real way of varying method; and at the time of the study there was neither rotation nor change of task. The feeding task, which made up most of the job, was rigidly machine paced; the operators could stop the machine if in trouble, but it was understood that this was only a last resort. The feeding task was done seated, and standing was only possible when fetching trays or attending to the machine.

Bottle Packing. Job 31

Some of the powdered products were packed in bottles; on two main sizes this was done by machine

with manual operations at some stages. The commoner size of bottle was six inches high, having a wide neck and screw top. The total team to a machine was six people, of whom two were in a sense different from the rest, the chargehand and the capper. The real responsibility for machine attention fell to the chargehand, assisted by a fitter at times; her job was not considered to be repetitive.

Empty bottles were fed in a different room to a conveyor system which supplied all six machines; one of the tasks of the first operator on the machine was to see that the flow was sufficient, and to free any jams on the conveyor. She also watched the output of filled bottles, noting any obvious deviations from the normal contents; any serious trouble she reported to the chargehand or fitter. Occasional bottles escaping unfilled she put back into the empty side of the filler. If the machine was running well she would help the next operator, who put on a gummed paper disc over the bottle top before the lid was applied.

This task called for dexterity and practice. The operator sat by the side of the track on which bottles passed at the rate of 26 to 30 per minute (the speed varied a little between machines), equipped with a water brush and a supply of round discs gummed on one side. The brush had a reservoir of water supplied slowly to the bristles; the discs were sometimes separated by the machine minder if she had time. The operator held a pack of discs in her left hand, and separated one at a time with her fingers; with her right hand she wetted the rim of a bottle, using the brush. The disc was then put neatly on the bottle top. It was necessary to wet only the bottle rim, dropping no water into the contents; the disc was a neat fit, and if placed more than a tenth of an inch out it would not cover properly. The speed was such that the operator was wetting one bottle while still placing the disc on the previous one.

The next operation was mechanical, the dipping of the bottle neck in melted wax: after this the screw cap was fitted, also by machine. One operator, the capper, regulated the flow of caps and stopped the machine if trouble arose, but she did not act as a true machine operator. Bottles then arrived at a labelling machine, which operated by rolling the bottle over a glued label. There was a labelling machine attendant, again regulating flow and supplying labels rather than operating the machine. She had little to do on it, and spent part of her time helping the last girl, who packed the bottles 24 at a time in cardboard containers. These were supplied by an overhead runway from upstairs, and one of the ways the labeller could help was by regulating their flow. The packer had plenty of time to do her work, except when old cases were being used.

The machine watcher, the girl who fitted discs, the labeller and the packer formed a team. The two former exchanged tasks every half-hour, as did also the two latter; at hourly intervals the pairs changed round. One of the tasks, placing discs, was done sitting, the rest standing. The capper did not rotate, and differed from the team in other ways; while they moved to a fresh machine each week in one direction, the capper and the chargehand moved in the other direction and worked with a different team. There was no essential difference between machines (of which there were six), but some packed a bottle of twice the capacity, and there were slight differences in speed. The capper's job was regarded as a junior one suitable for beginners.

The team jobs had rotation but no change of task; the only variety was the infrequent one to a different

size or slightly different speed. There was no real way of making a variation in method, and two tasks were paced, fitting discs rather fast and packing slowly. All the tasks allowed for some talking; even the disc placer could talk so long as she kept her eyes on the bottles. No great demands were made on intelligence, but the disc fitting task was not an easy one to learn.

Miscellaneous Jobs. Job 32

There were certain packs in bottles which the machines would not take: large bottles, or bottles specially packed for export. These jobs ran at irregular intervals, and no one item lasted for more than a few days. They were purely manual jobs and nearly always done by a team; when there was no work on this line for the operators, they went on to any work available, such as feeding the bottle conveyor mentioned in Job 31, or to replace absentees.

From the nature of the work it was necessary to have on it a certain number of fairly intelligent operators capable of picking up new tasks quickly; a general familiarity with packing operations was desirable, and the regular operators were people of some years' experience. The job entailed frequent change of task, and sometimes rotation; with the change went a considerable freedom for operators to vary methods. There was no variety of material within any one task, change of task automatically entailed variety. Pacing was at the speed of the team, and this was in general fast—faster in terms of activity than most of the machine paced tasks. The work was also heavier in that larger units were handled. Most of the tasks were done seated, a few entailed standing.

'FACTORY' No. 8: ROUTINE OFFICE

Factory No. 7 had offices not only for the Works itself but also for the general administration and sales side of the Company. These employed some 200 people of all grades, and included two departments, Filing and Invoicing, where the work was so repetitive as to be comparable with production jobs.

The Filing Department consisted of 17 people, mostly girls 16 to 21 years old except for the supervisor, who was more experienced. Girls were usually recruited from the training section (which served all the offices) and this was their first 'useful' job; it had been regarded as a place to stay in for not more than three years before being transferred to some other office. At the time of the study, girls were being encouraged to stay on for a longer period, and section heads had been created to this end. The department was in a room closed off from the other offices.

Invoicing department was at one end of an open general office, and a good deal of traffic passed through—messengers, people with queries and so on. It had a staff of 22 including the supervisor, an older woman, not very popular because of her tendency to interfere rather than let people get on with the job themselves. There was a recognised hierarchy of jobs in the department, which would take a junior about five years to ascend; at the end of this time she might, if good enough, expect a typist's job.

Filing Department. Job 33

The overall operation here was to file away correspondence arriving from other offices, and to produce it on demand. The supervisor viewed all letters arriv-

ing and split them according to the sections into which the trade was divided; the relatively small amount of confidential matter she dealt with herself, passing on the remainder to the section heads. The latter checked that the material was appropriate for the particular section, that it had been cleared by all those to whom it was marked out, and noted if there was any need for cross-reference. This happened when correspondence from a firm had been sent as from an individual in it; occasionally the letter would be filed under the firm's name, with a reference slip under that of the individual. The section head 'arrowed' the letters, stamping an arrow (with her initials) opposite the name under which filing was to be done.

Only at this stage did the actual filing clerks, the people concerned in the job studies, take over. Their first task was to sort the correspondence into alphabetical order of arrowed names; they did this in two stages, first by initial letter and then within initial letters as far as necessary. The letters were laid on a desk and sorted to a concertina-like file with compartments alphabetically arranged; this was held on the operator's lap. In one section the head did this task, helped occasionally by a filing clerk; in other sections, the clerks did it with some help from the head. (The head of a section was nowhere very different in status or duties from the clerks.)

Each filing clerk was equipped with a two-level stool which she could carry or push around the file drawers, which altogether presented a frontage of 150 feet or more and ran up to 5 feet high. To work a lower drawer, she sat on the lower seat, using a projecting shelf to carry papers; the upper drawers could be dealt with from the higher seat, or by standing. Filing the day's work took four hours or so; the usual quantity was 300 items, but this varied. Difficulties arose when the arrowed name had no corresponding file; this meant making out a new file after checking with the section head that there was no error in the arrowing.

Making new files was one ancillary task of the clerks; files were lettered by hand in script. Other extras were dealing with change of address; and making out cross-index cards. Yearly, each file was cleared to a transfer box; this was not all done at one time, but was tackled gradually at times when the main filing work was light. The transfer boxes had to be lettered by the clerks. The filed correspondence was often in bundles which had to be kept together, and the clerks did a certain amount of stapling, clipping and pasting to effect this.

Requests for previous correspondence—'P.C.'s'—were supposed to come through the internal post, but did not always do so. Frequently enquirers came in person, and caused some interruption to routine by consulting any filing clerk instead of the girl responsible. Although obviously a necessary part of the job, and in fact the justification for the department's existence, they tended to be regarded as a nuisance; from the filing clerk's point of view they upset neatness and order. Those which came through the proper channels and could be dealt with at a planned time were not resented so much as requests for immediate service, which upset routine.

The job was one taking more than a week to learn to do fast and accurately; this in addition to the preliminary period in the training school, which was mostly a matter of learning the layout of the place and the local customs. It called for a certain amount of intelligence, but probably not as much as the machine operator's job (Job 19); the need was more

for memory and a pride in doing a neat job. There was no change of task, but plenty of rotation; rotation, moreover, in a fashion which allowed the operator to vary the order of doing parts of the job. There was variety in the defined sense of differences in the material handled, and the job allowed freedom to move about.

Invoice Department.

Several tasks were involved here, which were combined into two possible jobs, one done by a grade known as 'intermediate', the other done by juniors. Some explanation of the department must precede a description of the jobs.

Orders arrived at the supervisor on a form showing the material, quantity, price and cost; with the order was a 'terms card' showing the customer's credit position, discount and so on. The supervisor split these into orders from new and old customers; the new orders went to the addressograph embosser for a plate to be made; the old orders were divided by the supervisor between two addressograph stampers. These two sought the appropriate plate and stamped it on a 'master' invoice, which was passed to a junior with the originating papers. The embosser made new plates, then stamped a 'master' from them which joined the old orders. The junior put on a serial number and date and passed the 'masters' back to the supervisor.

The supervisor issued the 'masters' and their appropriate papers to typists, who copied on the details of the order. The typists preferred to fetch a batch of work at a time and finish it; the supervisor usually put it into their trays just before the previous batch was ended, and this led to a certain dislike of her methods. In the course of the job studies it was suggested that the addressograph was unnecessary, and that the address could more easily be typed; this fact was admitted, but the addressograph plates were continued for use in mailing lists.

The typists passed 'masters' to a checker who ran over the calculation of money as well as accuracy of copying, sent back errors to be rectified, and passed on correct 'masters' to the 'Ditto' machine. This, worked by juniors, made up to 25 copies from a 'master'; the actual number varied, but was usually less than this. The number of copies depended on the customer, method of carriage, and so on; the operator had to know from the papers, still accompanying the 'masters', how many copies to take and on what forms. Apart from checking now and then that the machine was running good copies, she did not deal with the output; it ran off into a box and was collected for sorting and removal to its various destinations. The originating papers she laid aside and these also were collected.

The department had work for 8 girls of 'intermediate' status and 6 juniors, but actually employed more because of time taken in varicous day continuation classes. The object of the tasks has been described; they were combined into two jobs, which are dealt with below under the headings of the grade of person employed.

'Intermediate' Job. Job 34

The operators on this work spent at least half of their time typing, and the rest between addressograph embossing and checking. One girl typed all the time. The typing was entirely copying of a routine nature. Checking was also routine, but demanded attention;

by letting it become too much routine one could overlook mistakes. Checking the amounts charged required some alertness. The embossing machine was much slower to use than a typewriter, requiring the letters to be swung round individually.

Training time on this job could be as short as a day or two, provided the operator had already mastered the art of typing. There was little demand on intelligence, except in spotting the few obviously absurd orders which might arise. The demand was not on the continuous use of reasoning, but on the type of patient observation that could call up a reserve of intelligence when needed. The job had rotation but no change; and except possibly on the embossing task there was no real chance to vary the method; the fact that the girls were not allowed to fetch their own work in batches has been mentioned. The typing was all done seated, whereas embossing allowed some standing and movement. None of the work was paced.

One should mention that the 'masters' were typed on a special hectographic carbon paper which was messy to handle. Gloves were provided to avoid stains on the operators' hands, but some people found it so difficult to type in them that they preferred to do without.

'Junior' Job. Job 35

The juniors alternated between operating the addressograph stamper, operating the 'Ditto' machine, numbering and dating 'masters', and sorting the finished copies coming off the 'Ditto' machine. All these tasks were messy except the last, operating the 'Ditto' machine being the worst.

The stamping task began with the arrival of orders. The operator took a convenient number and sorted them into counties, further sorting these into alphabetical order of customers' names, this being the order of filing the plates. She opened one drawer, taking out a plate and marking the place with the next plate up-ended; this need to mark the place prevented her from dealing with more than one drawer at a time.

The plate she clipped into the stamper, laying over it the blank 'master' between two carbons; care was needed to position the 'master' correctly. Bringing down the hinged head of the stamper, she transferred the impression; the head sprang back, she removed the 'master' and put the plate back in its file. The aim of sorting the orders into the system of the plate files was to make sure of getting all the plates from each drawer at one opening. The average overall time per 'master' was a minute.

In operating the 'Ditto' machine, the first task was to clamp the 'master' on to a roller, which, the machine being switched on, would revolve so long as a control bar was depressed. Having selected a set of blanks for the invoice, the operator then fed these in one at a time, using the control bar to govern the start and stop. The number of blanks of various colours needed to make the set for an invoice varied, as has been mentioned above, and in addition to these the operator ran off a number of labels as indicated on the originating papers. This last task involved taking the 'master' off, tearing out the address portion and replacing it, and running again—perhaps the messiest task in the office when repeated a number of times.

There was a second girl who took the copies as they came off the roller and sorted them to pigeon-holes; the copies were of different colours, but even so the variations between orders by rail, van, post, etc., each

needing different numbers of documents, made the task one that could be confusing when done at speed. The numbers of labels varied also according to the number of packages making up the order.

The task of dating and numbering 'masters' requires little description. Some attention was needed to avoid mistakes in numbering, and one had to keep the desk tidy. A slight complication arose in that the day was split at noon, when the serial number went back to zero and the following day's date was used—this to allow for the time taken between invoicing and actual despatch. The dated 'masters' were passed on to the supervisor, who would notice any errors; consequently the operator's responsibility was limited.

Learning time for this job was not, as with the 'intermediate' job, complicated by the need to be able to type; but to learn it took a week or more,

in view of the various numbers of copies to be made. Learning was usually confined to one task at a time, and one could be partially effective as soon as one task was learned. The tasks did not make much demand on intelligence except in the learning period; once learned they were largely rule of thumb, though as with the 'intermediate' job, it was desirable to keep an intelligent watch for silly errors.

All the tasks were performed sitting, but the need to carry papers around gave opportunity for a change every hour or oftener. Rotation of task existed, but no change; and although there was variety of material, there was little chance to vary methods. All the tasks except sorting the finished invoices were messy, and gloves were provided; when working the 'Ditto' machine girls were allowed a period for washing. Overalls were needed on this task.

APPENDIX III

LISTS OF COMMENTS

The first list is of all the 'Comments' — *i.e.*, of all the general ideas referred to in the interviews. A 'comment' is the statement which is representative of a number of 'remarks', the latter being the actual statement or idea put forward by a particular person interviewed. The list of comments shows the classification into topics, used for reference purposes in the text, and also the number of remarks covered by each comment.

Certain comments do not fully express the remarks which they cover, and a second list is added showing in full the remarks concerned.

SUMMARY OF COMMENTS, showing number of remarks constituting each.

	<i>Comments</i>		<i>No. of Remarks</i>
1 PHYSICAL CONDITIONS			
A. Sitting and standing			
1. Likes to sit and stand alternately	40
2. Does not like to sit or to stand all the time	35
3. Sitting or standing for part of day	3
4. Likes to be able to move about on the job	25
5. Likes standing all the time	14
6. Likes sitting all day, or dislikes standing all the time	27
7. Does not mind sitting or standing all the time	3
8. Criticises seating arrangements	5
9. Appreciates seating arrangements	10
		—	162
B. Safety			
1. Appreciates safety of the job	10
2. Criticises hazards	26
		—	36
C. Cleanliness			
1. Appreciates clean work	55
2. Dislikes dirty work	41
3. Accepts unavoidable dirt	9
		—	105
D. Noise			
1. Dislikes a lot of noise	28
2. Can get used to noise	3
3. Accepts noise	1
		—	32
E. Ventilation and heating			
1. Appreciates present ventilation	2
2. Appreciates present heating	8
3. Criticises present ventilation	23
4. Criticises present heating	25
		—	58
F. Lighting and eyestrain			
Mainly critical, some appreciation	28
		—	28
G. Working space			
1. Dislikes cramped quarters	5
2. Appreciates tidy and well-kept place	9
3. Does not like indoor work	6
		—	20
H. Light or heavy work			
1. Appreciates light tasks	6
2. Finds tasks too heavy	22
3. Does not mind heavy task	3
4. Physiological effects	2
5. Pauses for rest, organised or unorganised: likes these	8
		—	41
K. Criticism of layout or methods			
Various, generally critical	18
		—	18

L. Air of rush and bustle

1. Likes rush and bustle around	6
2. Dislikes this	2
			—	8

			—	508
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2. MATERIALS, MACHINES AND EQUIPMENT

A. Ease of working

1. Likes material to run well	17
2. Likes machine to run well	...	...	...	15
3. Dislikes hold-ups due to poor materials or difficult material	...	...	109	
4. Complains of slight difficulty but nothing bad	...	...	11	
		—		152

B. Look of materials or finished work

1. Likes the look of them	...	...	...	24
2. Nothing in them to like or admire	...	...	...	11
		—		35

C. Maintenance

1. Maintenance considered good	...	...	...	5
2. Complains of poor maintenance service	...	...	...	11
		—		16

D. Tools and tackle

1. Finds tools, etc., adequate	...	...	...	1
2. Criticises lack of tools, etc.	...	...	...	5
		—		6

E. Attitude to working on machines

1. Likes to stay on her own machine	...	...	...	3
2. Dislikes moving to other machines	...	...	...	12
3. Likes to work with a machine	...	...	...	17
4. Prefers hand task to working a machine	...	...	...	27
		—		59

F. Protective clothing

1. Appreciates overalls and protective clothing	...	...	...	8
2. Criticises overalls and protective clothing	...	...	...	5
3. Wants more protective clothing	...	...	...	4
		—		17
			—	285

5. WORK FLOW

A. Supply of work

1. Likes good work flow	...	...	...	42
2. Dislikes poor work flow	...	...	...	55
		—		97

B. Tempo of work while doing a task

1. Likes busy tempo	...	...	...	...	44
2. Does not like slow tempo	...	...	...	...	22
3. Pace too fast	...	...	...	...	51
4. Pace too slow	...	...	...	...	8
5. Finds pace about right and likes being paced at this speed	...	...	...	...	25
6. Likes opportunity to go at own pace	...	...	...	...	34
7. Dislikes fixed pace	...	...	...	...	11
		—			195

C. Keeping count of production

1. Likes to see a big output	...	...	...	45
2. Does not like to see a poor output	...	...	...	13
3. Likes to keep count of production	...	...	...	51
4. Cannot or does not keep count of production	...	...	...	13
		—		122

D. Batching	1. Likes batching in its existing form	...	...	...	10
	2. Criticises batching in its existing form	...	...	...	3
	3. Dislikes lack of batching	...	...	...	15
					28
F. Team balance	Mainly critical	...	...	...	7
					7
					449
ORGANISATION OF WORK					
A. Team or individual work					
1. Likes working with other people from the social point of view	...	...	...	...	81
2. Likes company of others of own age	...	...	...	...	11
3. Does not like being in a team of mixed ages	...	...	...	...	8
4. Likes to stay with the same team	...	...	...	...	11
5. Does not like to shift from team to team	...	...	...	...	6
6. Likes to work on her own	...	...	...	...	20
7. Dislikes working alone	...	...	...	...	6
8. Appreciates team as a good working unit	...	...	...	...	29
9. Difficulties in team work	...	...	...	...	21
10. Remarks on getting adjusted to a team as a social group	...	...	...	...	12
12. Likes to be able to talk on the job	...	...	...	...	26
13. Dislikes job where one cannot talk	...	...	...	...	6
					237
B. Rotation of task, variety					
1. Likes task with rotation	...	...	...	...	64
2. Dislikes task with no rotation	...	...	...	...	7
3. Rotation does not give enough diversity	...	...	...	...	5
4. Change of type, size, colour, etc., gives variety and is liked	...	...	...	...	38
5. Change of type does not give variety	...	...	...	...	3
6. Would like more variety in the job	...	...	...	...	63
7. Has adjusted to lack of variety	...	...	...	...	17
8. Has enough variety in the job	...	...	...	...	9
					206
C. Change of task					
1. Likes change of task	...	...	...	...	114
2. Likes keeping to same task	...	...	...	...	15
3. Dislikes change of task	...	...	...	...	27
4. Dislikes keeping to the same task	...	...	...	...	13
5. Likes change of task within limits	...	...	...	...	18
6. Dislikes too much change of task	...	...	...	...	18
					205
D. Breakdown					
1. Likes 'whole' task	...	...	...	...	19
2. Dislikes 'whole' task	...	...	...	...	3
4. Dislikes broken down task	...	...	...	...	8
					30
E. Chance to organise work oneself					
1. Likes a chance to organise one's own work	...	...	...	...	25
2. Dislikes rigid imposition of method	...	...	...	...	10
3. Suggestion for better methods	...	...	...	...	6
					41
F. Clean up					
1. Accepts clean up as part of job	...	...	...	...	11
2. Does not like cleaning up	...	...	...	...	6
3. Various clean up remarks	...	...	...	...	3
					20
G. Methods					
1. Appreciates good (imposed) methods	...	...	...	...	7
2. Criticises poor (imposed) methods	...	...	...	...	13
					20

8. SKILL AND LEARNING

9. RESPONSIBILITY ARISING FROM THE TASK

10. PROMOTION AND STATUS

A.

1. Likes more responsibility or job of higher status	...	...	14
2. Dislikes idea of more responsibility	...	...	2
		—	16

11. DISTRACTIONS

A. Music while you work

1. Likes M.W.Y.W., wants more and better	...	...	13
2. M.W.Y.W. as a milestone in the day	...	...	2
3. Misses M.W.Y.W. if it is not on	...	...	2
4. Preferences in programmes of M.W.Y.W.	...	...	3
5. Does not like M.W.Y.W.	...	...	1
		—	21

B. Visitors

1. Visitors regarded as a nuisance	...	...	3
		—	3
		—	24

12. PAY

A. Amount of pay

1. Thinks amount insufficient	...	...	...	4
2. Compares amount favourably with previous jobs	...	...	...	7
5. Complains of inequities between jobs	...	...	...	5
		—		16

B. Piecework and bonus

1. Thinks it is an incentive	...	...	...	13
2. Prefers group bonus to individual bonus	...	...	...	2
3. Prefers individual bonus to group bonus	...	...	...	7
4. Prefers time rate or some bonus other than on straight production	...	...	...	3
5. Complains of piece rate or bonus	...	...	...	7
6. Dislikes time rate	...	...	...	1
		—		33
		—		49

FULL LIST OF REMARKS IN CERTAIN COMMENTS

1 A 3 *Sitting or standing for part of day.*

Likes standing job for half day.
Does not mind standing or sitting all of half day.
Used to standing a lot; finds she sits a lot now.

1 F *Lighting and eyestrain.*

Would like daylight on machining.
Fluorescent lighting not enough, local lighting needed.
Does not like 'daylight' lighting, makes eyes ache; might be the lighting or the task.
Quit's because of semi-darkness.
Local lighting tiring to eyes.
Eyes tired sometimes by evening.
Does not like artificial light all day on that job.
Not much daylight, all artificial light.
Dislikes dark corner in which to work.
Inspection leads to eyestrain day after day.
Left's because small work caused eyestrain.
Inspection job hurt eyes.
Complains of lighting increasing mistakes.
Lighting sometimes a bit dazzling, reflected off machines.
Plenty of daylight upstairs; eyes sometimes ache down here, blame artificial lights.
Job hard on the eyes.
Sealing hard on the eyes if at it all day.
Shine on caps hard on eyes.
Electric light all day tiring; now needs glasses.
Can't see much in way of specks but marks can easily be seen.
Passers can't see them in small cartons. Don't like it, too fiddly; waste of time.
Grey-black material softer; only the colour makes it difficult: doesn't like them.
Makes eyes ache; last job with white packs on white belt made you tired.
Dislike anti-catarrhal labels colour; strain on eyes.
Tiring to the eyes picking up tablets.
Nice lighting; comfortable.
Sunlight nice.
Type of lighting better her end of office.

1 H 4 *Physiological effects.*

Makes your legs ache putting a lot of plates away at a time.
Sorting makes you feel drowsy.

6 A 10 *Getting adjusted to team.*

Team did not work well together at first, O.K. now.
Effect of other people in team sometimes cheers one, sometimes depresses one.
Thought others unfriendly at first, too busy to talk.
Newcomers do better if put with a helpful team.
Likes job better now she has got to know the team.
Important to have a team mate you can get on with.
Cannot get on with this group.
Experienced people should not take a mike at newcomers.
Annoyance with partner.
Difficulty is in getting used to team, not task.
Chief difficulty is in getting used to people in team.
Liked department with fewer people in it.

6 E 3 *Suggestions for better methods.*

It was her idea to use ratchet screwdriver.
Suggestion for method improvement.
Made comments on extra rollers.
Found tape is better than clips.
Yes, better plate; suggestion for improvement.
Suggestion for improved method of filing.

6 F 3 *Other clean up comments.*

Discussion of cleaning technique.
Clean job except for clean up at end of day.
Keeping the benches scrubbed clean essential.

8 A 6 *Description of skill needed.*

Some forethought needed to keep taping machine supplied.
 Still finds it hard to pack 2 tins at a time.
 Description of certain skills and knacks in coil winding.
 Description of demands on skill.
 Description of demands on skill required.
 Fast bundler machine needs a knack.
 Checking more difficult than typing; got to know everything.
 Do things wrong on addressograph because confusing names.
 Easy really; a lot of memorising to learn.
 Took a week to become certain about Ditto machine; matter of memory.

8 B 2 *Learner difficulties in doing the task at all.*

Sealing difficult; not mastered.
 Sealing a problem for three months; packing never a worry.
 Description of enlightenment over difficult point of learning when almost despairing.
 Definite knack to be learned.
 Tries to help newcomers, remembering her own difficulties.
 Task hard to learn but O.K. when learned.
 Task hard to learn but then O.K.
 Filling up difficult to learn.
 Description of learning difficulties.
 Picking-up worrying to learn.
 Picking-up very worrying the first week.
 Experience on difficult machine was unsettling.
 Job difficult at first; worried her.
 Learning took about a week—agitated, not used to fingers.
 Difficult to learn; felt pretty desperate.
 Sealing exasperating to learn but liked when learnt.
 Finds it hard to pack 4 tins at a time.
 Not difficult, but awkward to learn; got to get feel of the wire.
 Getting the knack of handling the things the most difficult to learn.
 Difficult to learn when tablets were sticky.
 Could not get on with it at first; cutting lumps off where she shouldn't, etc.
 Some can't pick it up at all; applies to machines.
 Likes to see others doing the difficult tasks that she cannot do.
 Awfully difficult, especially Ditto machine—number of copies needed.
 Trouble with picking up job without definite instruction.
 Hard to learn so many different copies; automatic now.
 Addressograph embossing more difficult to learn than typing.
 Took about a week to get used to different orders.
 Not difficult to learn but get mixed.
 Difficult at first to know where to find things.
 Thought filing difficult; alphabet trouble.
's invoices terribly complicated.
's invoices the worst; so many of them.
 Filing easy; kept on going wrong on arrowing.
 Gets in muddle if left to sort alone; usually has help.
 This job completely different from last job to get used to.

8 C 1 *Description of demands on attention.*

Description of demands on attention.
 Got to keep remembering the work or the machine runs away with you.
 Got to remember to use the knee press to raise the foot and not to do so by mistake.
 Lower speed in one position. Occasionally slow down for careful work.
 Filling up boring; tied to keeping eyes on pegs.
 Need to keep mind on all jobs to avoid mistakes.
 Not much brainwork on Ditto even with different orders.
 Got to attend; things go wrong too easily.

Prefers typing to checking; latter needs hard concentration which is difficult with so much nearby noise.
 Must attend on checking; should attend on typing.
 On the whole have to concentrate.
 Got to keep mind on job, but not experienced yet.
 Needs most of one's attention.
 Have more or less to think about what you are doing.
 Really must attend to filing; can talk on other things.
 Need to attend to avoid mistakes.
 Have to attend else make mistakes.
 Cannot think on some jobs but can on others when used to them.
 Easier to grab papers from right pigeonholes on Ditto machine than put them into right ones when sorting.

8 C 3 Description of what one thinks about when doing the task.

Thinking about other things makes you work harder.
 Can think of other things while on the tasks; thinks of what to do with monthly bonus.
 Not much demand on mind; talks and thinks of domestic things.
 Task needs attention but not thought; suits her.
 Occupies mind with thoughts of spare time activity.
 Most tasks do not need full attention; occupies mind in dreaming about winning pools and such things.
 Thinks of spare time activities to occupy mind.
 Occupies mind with domestic thoughts.
 Occupies mind with domestic thoughts ("next meal").
 Hardly any attention needed for the task. Occupies mind with word games and so on.
 You run out of things to talk about; can mindwander.
 For young people would be horrible; thinks out meals, etc., herself.
 O.K., got quite enough to think about with home to look after.
 Often planning tomorrow's meals whilst working.
 Looks at clock to avoid mind wandering.

8 D Preferences in tasks

Thinks it important to have a task you like.
 Some departments less boring than others.
 Prefers sealing to watching machines.
 Prefer doing glucose in packets.
 Prefer power presses.
 Hand machines very awkward.
 Small presses with banders—like those, able to do better on them.
 Hand press not too bad, prefer power press.
 Likes hand presses better.
 Likes ampoules best, don't know why.
 Thinks it is important to do the work you like.
 If you like the work you do not feel tied.
 Likes big office better than private secretary; meet more people.
 Does not want anything else except tin pack.
 This work really more interesting than messenger work.
 Invoicing a bit more interesting than filing.
 Likes the work (and the people), so refused transfer.
 Does not like counting all the labels in sorting; not so bad putting them through Ditto machine.

11 A 4 Preferences in programmes

Likes 'Housewives' Choice'.
 Don't like jazzy music; bands better; could not please everyone anyway.
 Wireless cheers me up a bit; 'Housewives' Choice'.

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